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The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

YEAR ENDING NOVEMBER 30, 1921



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APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.

DEPARTMENT OF AGRICULTURE, 1921.

Commissioner of Agriculture.

ARTHUR W. GILBERT OF BELMONT.

Advisory Board appointed by the Governor and Council.

	Term expires Nov. 30.
HERBERT N. SHEPARD OF WARREN	1922
EDWIN H. PRIEST OF LITTLETON	1922
JOHN BURSLEY OF BARNSTABLE	1923
STUART L. LITTLE OF NEWBURY	1923
LESLIE R. SMITH OF HADLEY	1924
EVAN F. RICHARDSON OF MILLIS	1924

Organization of the Department.

DIVISION OF DAIRYING AND ANIMAL HUSBANDRY

O. M. CAMEURN OF ARLINGTON, *Director*.

DIVISION OF AGRICULTURAL INFORMATION

JOHN W. PLAISTED OF CAMBRIDGE, *Director*.

DIVISION OF MARKETS

WILLARD A. MUNSON OF WALPOLE, *Director*.

DIVISION OF ORNITHOLOGY

EDWARD HOWE FORBUSH OF WESTBOROUGH, *Director*.

DIVISION OF PLANT PEST CONTROL

R. HAROLD ALLEN OF MANSFIELD, *Director*.

DIVISION OF RECLAMATION, SOIL SURVEY AND FAIRS

LESLIE R. SMITH OF HADLEY, *Director*.

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The Commonwealth of Massachusetts

REPORT OF THE COMMISSIONER.

SUMMARY OF THE WORK OF THE DEPARTMENT.

The business of farming in Massachusetts has perhaps enjoyed a greater degree of prosperity during the past year than most other kinds of business. The long depression which has hung over eastern farmers for more than a decade is beginning to disappear. The increased freight rates on food products brought into New England from great distances have thrown a greater responsibility upon Massachusetts farmers, and incidentally a greater opportunity. The possibilities of farming in Massachusetts which thoughtful leaders have predicted for some time are now beginning to manifest themselves, and considerable acres of arable land which have not been in cultivation for some time are now being brought back into active use. This is a beginning of the rejuvenation of Massachusetts agriculture.

Farmers as a class are coming to realize the importance of a near-by market, and the necessity of specializing so as to adapt their particular kind of farming to the needs of the market and the peculiarities of the physical conditions of our soils and land surface. They have learned not to compete with the West in the raising of crops for sale, such as wheat and corn, which can be more economically grown in the great fertile stretches of the West. The farmers who are specializing in the raising of apples, garden truck, tobacco, onions, cranberries, poultry and milk are now enjoying a degree of prosperity which bids fair to encourage a rapid expansion in the production of these specialties.

The work of the Massachusetts Agricultural College and the farm bureaus, as well as the impetus on the part of farmers themselves for obtaining up-to-date information on modern

methods of raising crops, is tending to reduce the cost of production and enabling these farmers to meet the big demands of a valuable near-by market.

The activities of the State Department of Agriculture in its various branches have played a large part in this rejuvenation of Massachusetts agriculture. The Division of Markets is pointing out methods of more economical marketing, and through its daily and weekly market reports is keeping growers, market men and consumers in close and constant touch with market conditions and market prices. The Division of Fairs is assisting the various fair associations and granges of the State to bring about stimulating competition, all of which tends to improve the quality of agricultural practice and to assist in its expansion. The soil surveys are being continued to give the farmers more information as to the physical and chemical value of the soils of the State and their proper treatment. Various lands now unused, principally because of their wetness, are being drained or otherwise modified to bring them into commercial use. There are many thousands of acres of such land in the Commonwealth which if brought into cultivation would supply food for many hundreds of thousands of our population.

The work with insects has been carried forward with vigor, and the spread of the insects now especially troublesome, such as the corn borer, has been confined to a small additional area, where spread was unavoidable. The great interest in birds in the State, due principally to the work of this Department, has allowed the valuable birds to be preserved and cared for in greater numbers so that they could do their share in controlling insect pests. The average person has little idea of the tremendous benefit to agriculture through the control of insects by many of our birds.

The study of agricultural problems, not only by farmers but by many persons living in cities, is also evidenced by the tremendous demand for bulletins and other kinds of agricultural information. We have been very careful to distribute bulletins only to persons who seem likely to make the very best use of them.

One of the outstanding contributions of the year has been an investigation on the part of two members of the faculty of the

Harvard Medical School on the diseases of turkeys. The results of their research have been published by this Department in a bulletin for which there has been a widespread demand. This research points out practical methods of preventing the fatal blackhead disease which has done more than any other single factor to drive out the turkey industry from New England. Growers who have become acquainted with the researches of Drs. Tyzzer and Fabyan are now finding it possible to carry on again a successful turkey business in this State.

PURE-BRED LIVE STOCK IN MASSACHUSETTS.

Massachusetts is one of the outstanding States of the Union in the production of pure-bred live stock. Many of the great foundation herds of the country are located here. During the past year there has been a notable gain in these herds. Every encouragement should be put forth to maintain our reputation in this direction. One of the great menaces to the pure-bred live-stock industry is the presence of considerable numbers of scrub bulls running loose in back pastures which are usually poorly fenced. These animals often cause great damage by mating with pure-bred heifers. I recommend legislation to make it illegal for such scrub animals to run more or less at large in this way.

RELATION OF AGRICULTURE TO BUSINESS.

We have done everything possible during the past year to bring farmers and business men together. Many conferences have been held and addresses made before chambers of commerce and other organizations to point out the necessity of the stimulation of agriculture in Massachusetts for the future welfare of the Commonwealth, and our business men and manufacturers have been very helpful in many ways to the farmers, particularly in providing better credit facilities, assisting in co-operative efforts, and offering the best business experience to farmers for the solution of their problems, especially those which have reference to the buying and selling end of the farming business. We believe that more active co-operation between farmers and business men will be one of the principal

factors in bringing about the improvement of agricultural conditions in this State. We wish to point again to one of the best illustrations of this co-operation in the work being done by the Plymouth County Trust Company to aid many farmers in the vicinity of Brockton, and to the activities of business men of Springfield through the Hampden County Improvement League and the Eastern States Agricultural and Industrial Exposition.

DAYLIGHT SAVING.

It cannot be doubted that a régime of daylight saving throughout Massachusetts has been detrimental to its farmers. This has been attested to by hundreds and thousands of farmers throughout the Commonwealth. Because of the importance of raising greater quantities of food near by for the purpose of assisting business men and manufacturers of Massachusetts in their competition with others in western and southern sections, it would seem that a daylight-saving régime, injurious as it is to farmers, is not only detrimental to them, but in the long run injurious to the best interests of Massachusetts residents as a whole. We believe that many of the most thoughtful and far-seeing of our business men are coming to realize this.

I would suggest a careful study of the new law in New York State which provides for standard time, but allows for local option in the towns and cities of the State. In considerable measure this alleviates the difficulties of farmers, and at the same time allows urban communities to enjoy daylight-saving time.

INSTITUTION FARMS.

Under the administration of the Commissioners of Correction, of Public Health and of Public Welfare are thirteen institutions that have farms as adjuncts. These farms range in size from little more than a garden of twenty acres to farms containing hundreds of acres of arable land. In addition to the production of farm and garden crops all have projects in animal husbandry. Each institution farm carries swine primarily to salvage table, kitchen and similar wastes. Twelve of them carry dairy herds. All of them carry horses, and some have oxen, for farm and general institution work. Most of them

have poultry plants. The institutions with which these farms are connected range from prisons through reformatories for men, for women, for boys and for girls to almshouses and homes for defectives, sanatoria for tuberculous men, women and children, and a hospital school for making self-supporting men and women out of boys and girls badly crippled, crooked and twisted by disease.

Naturally the first care of the superintendents is the institutions as a whole, and with chief reference to the purpose for which the institution was established. Occasionally there is a superintendent who likes gardening or farming and finds recreation in quite closely following up farm projects of all kinds. But more often the farm occupies a side place in administration. Any one who has first-hand information of institutions recognizes the necessity for farms and the large place they occupy as adjuncts to institution life. Much in the way of reformation of character and the development of mind and body is associated with touch with the land.

One large group of institutions in another department has so many and such large farms that in the business management of the department an agricultural expert has been employed for a number of years. But in the three departments here referred to the farming has gone along without any general oversight, without much co-operation between farms in the same group, and still less between farms in different groups of institutions.

As requested by the Legislature several years ago the State Auditor has prepared an excellent set of blanks for the annual reporting of farm operations at all the institution farms. These reports are filed annually with the commissioners concerned and with the State Auditor. Neither the commissioners nor any one in the Auditor's office are trained agriculturally. And when one of the commissioners had a clerk attempt to "reconcile" the farm reports with the analysis sheet of the institution finances for that year, it was speedily found that mere statistical methods were insufficient. As a result, first this commissioner, and very soon thereafter each of the two other commissioners, asked this Department if it would co-operate with them and make something of a study of the institution farms, their efficiency, ways in which they could be best utilized for

food production for the inmates, and in other ways be improved as adjuncts to institution management. This request was made the very last of October. During the month of November, 1921, the farms and their operations were studied as completely as the length of the time and the season of the year would permit by a man agriculturally trained and of large executive experience in both the practical and scientific aspects of farming.

These studies were made at the institutions with as much thoroughness as an average of two days per farm for travel and study would permit. Through this study a general picture of the farming at each institution was had and recorded. Particular attention was paid to the methods of farm accounting in use. It was found that while the financial administration of the institutions, and hence of the farms themselves, was well handled from the viewpoint of expenditures and receipts of the institution as a whole, there was only very partial segregation of the farm from the other departments of the institution. Naturally this varied from quite a complete segregation at institutions where farm projects were numerous to almost a disappearance of lines of demarcation at other institutions.

The immediate result of this first preliminary survey in what is hoped may be merely the beginning of a co-operation between this Department and the three commissioners above named, is a request on their part that this Department make further study of the methods of farm accounting, and in co-operation with the Auditor's department devise and put into effect a system of farm accounting of such a nature that the institution office shall have records that will serve for the preparation of the farm report for the Auditor; as a history for a guide for further farm operations; as a measure of the efficiency of the farm management; and as a comparative study of the operations at the different farms from the agricultural viewpoint. This will be undertaken very early in the coming year.

It is believed that this co-operation will result in a better management of the farms as institution adjuncts, and it is also believed, from the standpoint of this Department, that from the farm reports and the following out of suggestions that will emanate from this Department there will accumulate a fund

of agricultural information on both plant and animal production that will, when analyzed, give information of value to the farming interests of the State. In other words, this co-operation should prove valuable to the institution farms through better co-ordination and improved farm management, and to this Department by bringing to it a mass of farm practice, a study of which will doubtless disclose many things useful to the agriculture of the State.

RELATIONS WITH OTHER AGRICULTURAL AGENCIES.

Close and cordial relationship with the Massachusetts Agricultural College, farm bureaus, agricultural schools and others has been carried forward again during the past year to the benefit of all. A working agreement has been entered into which brings about maximum usefulness and prevents unnecessary duplication of work. I am pleased to record the perfecting of a closer organization of the farm bureaus of the State during the past year, and the harmony which exists between farmers' organizations, such as the farm bureau and the State grange. The various commodity organizations, such as the vegetable growers' associations, live-stock associations, onion and tobacco associations, and others, are entering more and more into a close co-operative working relationship which is very commendable.

WORK OF THE STAFF.

I wish to record the enthusiasm and vigor with which members of the staff of the Department of Agriculture have pursued their work during the past year. They look upon this work as an opportunity for service, and believe that they are making a very great contribution to the welfare of the Commonwealth as a whole. Most of the members of the staff work hard without reference to hours or personal convenience. Such unselfish public service deserves recognition.

CHANGES IN THE STAFF.

There have been very few changes in the staff during the past year. On January 1 Mr. William E. Maloney began the work of market reporting in the Division of Markets, taking the place of Mr. Harry Campbell.

Mr. Quincy S. Lowry was appointed assistant director of the Division of Plant Pest Control on April 21 to fill the vacancy caused by the resignation of Mr. Leland H. Taylor.

Mr. Stephen R. Dow, supervisor of the Boys' Farm Placement Bureau of the Division of Information, left the service of the Department on July 16.

REGULATORY WORK.

In the line of efficiency a slight reorganization of the Department of Agriculture should be made. At present the various lines of regulatory work, such as the administration of the apple-grading law, oleomargarine law, and others is being done by various divisions, and the men who do this work have also many other duties to perform. This splits up their time in such a way that a good deal of time and energy is wasted. I suggest putting all of this regulatory work under one head in one of the present organized divisions. This will save money and will allow better work to be done in the long run.

FUTURE OF MASSACHUSETTS AGRICULTURE.

Farmers who are carrying on a type of farming adapted to conditions in this State, and who apply the skill necessary to conduct any business successfully, may look forward to a large degree of prosperity in this State. The agencies to assist them are at hand. Considerable outside capital is being attracted to the farming business, — a good evidence of its prosperity and possibilities. Several large corporate agricultural enterprises have been organized and give promise of financial success. Men and women from the cities and from other States are being attracted to purchase Massachusetts farms and to conduct them for profit. These are all signs of a possible successful agriculture. Some lines of farming, such as raising of cranberries and onions, are now seeking markets elsewhere, as they are raising greater quantities of their products than can be absorbed here. We look forward to surpluses in other specialties, such as fruit, vegetables and poultry in the near future. There is an enormous demand for American apples in England, and I predict the time will soon come when many shiploads of

Massachusetts apples will be sent each year to Europe. There is a strong tendency for apples to be grown more skillfully and packed carefully in boxes, thereby replacing on our markets considerable quantities of western apples formerly coming in here. There is no reason why all of the apples sold in our markets should not be grown in New England. It is well known that the quality and flavor of New England apples are far superior to those raised under conditions of irrigation in the orchards of the North and West. The apple-grading law is doing much to give our apples a reputation, not only in our own markets but in those outside. During the last few years Massachusetts apples have sold in considerable quantities as far west as Detroit.

LEGISLATIVE APPROPRIATIONS.

One of the principal ways in which the Commonwealth of Massachusetts can be of assistance to its farmers, and thereby to all of its citizens, is to give greater financial aid to its own State agencies. The State Department of Agriculture and the Massachusetts Agricultural College have created machinery for the assistance of farmers of the Commonwealth, and additional appropriations to these agencies will return a rich reward to the State in the form of an improved and prosperous industry. It should be pointed out, also, that the prosperity of the farmer immediately reflects itself in his purchasing power. The wholesale and retail establishments of our cities are first to feel the prosperity of the farmer, because of his increased buying power. One of the principal reasons for the business depression which this and all of the other States of the Union have been going through has been the depression of the American farmer because of deflation and his withdrawal in a large measure from the market. Purchasing of materials on the part of the American farmer has been reduced to a minimum during the past year or two. It has been because of this, more than any other single factor, that our factories have been closed, — because of the lack of demand for goods.

REORGANIZATIONS OF THE DEPARTMENT, 1918 AND 1919.

In the annual reports for 1918 and 1919, brief accounts were given of the change from the Board of Agriculture to the Department of Agriculture and the subsequent reorganization of the Department into its present form. For purposes of record it seems appropriate to present additional detail about these reorganizations.

The basis of representation for the State Board of Agriculture, first established in 1852, was destroyed by the so-called Anti-aid Amendment to the State Constitution, adopted in 1917, because this amendment made impossible the payment of bounties to private agricultural societies. The General Court, therefore, during the session of 1918, passed an act establishing the Department of Agriculture, to consist of a board of fourteen members appointed by the Governor, with the advice and consent of the Council, and a Commissioner of Agriculture to be elected by the board for a term of three years and subject to removal by the board for cause. This law did not increase nor define more particularly than before the powers and duties of the board or Department, and it left the Commissioner responsible and subordinate to the board.

The next year, under article 66 of the Amendments to the Constitution, which required that the executive and administrative work of the Commonwealth be organized in not more than twenty departments, a general reorganization of the State departments, including the Department of Agriculture, was undertaken. In the bill which was ultimately adopted (chapter 350, General Acts of 1919), the Department was reorganized again on the same plan as other administrative departments (sections 34-38 inclusive). These sections provide that the Department shall be under the supervision and control of a Commissioner of Agriculture and an advisory board of six members, all appointed by the Governor, with the advice and consent of the Council. The Commissioner is made the executive and administrative head of the Department in full charge of all its work, while the advisory board exercises only advisory powers. It is further provided that the Commissioner shall organize the Department in divisions, including a Division of Dairying and Animal Husbandry, a Division of Plant Pest Control, a Division of Ornithology, a Division of Markets and a Division of Recla-

mation, Soil Survey and Fairs, and such other divisions as he may from time to time determine. With the approval of the Governor and Council, the Division of Agricultural Information was established soon after the reorganization went into effect.

By section 38 (as amended by chapter 206, Acts of 1921) the powers of the Department are prescribed as follows: —

SECTION 38. The department of agriculture through its proper divisions shall have power to:

(a) Execute and carry into effect the laws of the commonwealth relative to dairy products, animal breeding, apple grading, plant pest control with the exception of the gypsy and brown tail moth, ornithology, apiary inspection, and the production, storage, marketing and distribution of agricultural products.

(b) Aid in the promotion and development of the agricultural resources of the commonwealth and the improvement of the conditions of rural life, the settlement of farms and the distribution of the supply of farm labor.

(c) Investigate the cost of the production and marketing in all its phases, and the sources of supply, of agricultural products, and the production, transportation, storage, marketing and distribution of agricultural products sold, offered for sale, stored or held within the commonwealth.

(d) Collect and disseminate data and statistics as to the food produced, stored or held within the commonwealth, with the quantities available from time to time and the location thereof.

(e) Investigate and aid improved methods of co-operative production, marketing and distribution of agricultural products within the commonwealth.

(f) Offer prizes for and conduct exhibits of flowers, fruit, vegetables, grasses, grains or other farm crops, dairy products, honey, horses, cattle, sheep, swine, poultry, poultry products, rabbits, hares, farm operations, and canned and dried fruits and vegetables.

The important features of this reorganization were the centralization of authority in the Commissioner, the establishment of a definite organization by divisions, and a specific definition of the Department's powers and duties. In the codification of the General Laws, completed in 1920, the provisions governing the organization of the Department were included in chapter 20, and the provisions prescribing its powers and duties were to a large extent included in chapter 128.

CONCLUSION AND RECOMMENDATIONS.

In the foregoing I do not wish to overlook the fact that the farmers do have serious problems to face, nor to give the impression that everything with them is prosperous and needs

no careful consideration and encouragement. While the agriculture of the State is improving, the farmers have many difficulties to combat, and are in reality going through a very critical period. I recommend that the Legislature give all possible consideration to their problems.

The Department of Agriculture is planning to meet these new conditions by strengthening its work in every possible direction, limited only by the funds at its command. It has a well-trained staff which should be increased in numbers to meet the serious problems which come up constantly, and to plan new lines of work to assist farmers, dealers and consumers. It should be emphasized that the Department of Agriculture does not exist for farmers alone, but may be of very great help to all citizens of the Commonwealth.

It is my hope that all citizens of the Commonwealth, particularly members of the Legislature, will become conversant with the work of the established agricultural agencies. I recommend that the valuable publications of the Department be given greater publicity and circulation, particularly through members of the Legislature who are in a position to place them with persons who will make best use of them. Some members of the Legislature are already taking advantage of this opportunity.

We should no longer look upon Massachusetts as a non-agricultural State. The amount of food which it is possible to produce here is three to five times the present production, and this possibility can be realized if proper steps are taken to stimulate farmers and to bring producers and consumers nearer together.

I recommend that the Legislature make a careful study of tuberculosis among cattle in Massachusetts. The United States Department of Agriculture is doing a great work in co-operating with the States in the eradication of this disease. It is well known that one of the great sources of tuberculosis among human beings is of bovine origin. I recommend that the Commonwealth of Massachusetts co-operate with the United States Department of Agriculture in every possible way to eradicate this dread disease from this Commonwealth.

Respectfully submitted,

ARTHUR W. GILBERT,

Commissioner.

ANNUAL REPORT

OF THE

DIVISION OF DAIRYING AND ANIMAL
HUSBANDRY

FOR THE YEAR ENDING NOVEMBER 30, 1921

REPORT OF THE DIVISION OF DAIRYING AND ANIMAL HUSBANDRY.

INSPECTION WORK.

In the law enforcement work of this Division 8,392 inspections have been made over the State, resulting in 43 court cases and 43 convictions. Forty-one of these were violations of the oleomargarine laws and 2 were violations of the milk laws.

Summary of Inspections.

Total number of inspections	8,392
Number of inspections where no samples were taken	8,043
Number of samples taken of butter, oleomargarine and renovated butter, all purchased	349
Number of samples taken during inspections	32

COURT CASES PROSECUTED.

The charges in the several cases prosecuted in court during the year were as follows:—

Furnishing oleomargarine in restaurants, etc., without notifying patrons	10
Selling oleomargarine in unmarked wrappers	10
Selling oleomargarine without signs on vehicle	6
Selling oleomargarine without displaying sign	1
Selling oleomargarine without registering	1
Selling oleomargarine when butter was asked for	1
Selling oleomargarine in imitation of yellow butter	12
Selling cream below standard	1
Selling adulterated milk (skimmed)	1

Summary of Court Cases prosecuted during the Twelve Months ending November 30, 1921.

CITY OR TOWN.	Where tried.	Month.	Cases.	Law violated.	Convictions.
Barnstable	Barnstable	December	1	Oleomargarine	1
Quincy	Quincy	December	6	Oleomargarine	6
Boston	Boston	December	1	Milk ¹	1
Boston	Boston	January	1	Milk ¹	1
Westfield	Westfield	March	4	Oleomargarine	4
Arlington	Cambridge	July	2	Oleomargarine	2
New Bedford	New Bedford	October	28	Oleomargarine	28
Totals	-	-	43	-	43

¹ In co-operation with James O. Jordan, milk inspector of Boston.

The members of the Division have addressed twenty-eight meetings on twelve subjects of interest to live-stock producers, and judged the live stock at one fair.

DAIRY SITUATION.

At the Eastern States Exposition an exhibit was made showing that Massachusetts breeders of pure-bred dairy cattle have shipped during the past ten years over 5,000 animals to 46 States, and during the past five years the number of pure-bred dairy cattle has increased from 11,956 animals to 17,531 animals, — an increase of over 46 per cent.

The fourteenth United States census shows that Massachusetts is making marked improvement in her dairy cattle. There is a pure-bred bull to every seven farms; only four States have a better showing. Over 9 per cent of the dairy cattle are pure bred; no State exceeds this. There are 46 dairy cows to each pure-bred bull; only one State has a better showing. Fifty-seven per cent of the dairy bulls are pure bred; only one State exceeds this.

According to the assessors' figures the year 1915 gave the lowest number of cows in the past fifty years, with 145,049; the report for 1921 shows 158,205 cows, an increase of 13,156 animals; the pure-bred dairy cattle during this same period increased 5,575 in number, which is 42 per cent of the total

increase, — all of which indicates that the dairy farmer is working to improve the efficiency of his cattle. There are now five cow-testing associations, which is the greatest number ever operating in this State. These include 98 herds and almost 1,800 cows. The annual report of the Southern Berkshire County Association shows that the average production per cow per year was 6,764 pounds of milk containing 269.3 pounds of fat, showing again that the dairy farmers are striving to develop efficient herds.

Furthermore, the dairy farmers have taken a greater interest in co-operative marketing, and have organized co-operative dairy companies to assure themselves of a market for their milk and to serve the public in their communities with a high quality Massachusetts produced milk. There are six producers' co-operative milk distributing plants operating in the State, and two additional plants are under consideration.

There is an increase in the amount of certified milk produced in the State. Seven farmers with approximately 775 cows are now producing this quality of milk, which is delivered in twelve cities.

The growing demand for special high quality milk has encouraged many dairymen to respond to this material expression of appreciation from the public, and increasing quantities of high quality milk are being offered to meet the demand.

The consumption of milk has increased during the past year in the various Massachusetts cities. Reports of the Department of Public Utilities show 169,000,000 quarts of milk shipped into Boston during the past year, which is an increase of 4,000,000 quarts over last year and an increase of 14,000,000 quarts over 1919. Milk is available to the pupils in 500 schools in Massachusetts cities and towns, resulting in increased efficiency among pupils.

DEMONSTRATION SHEEP FARMS.

The demonstration sheep farms are centers of service and information for the sheep raisers of their respective territories. During the year they have had 1,079 visitors and have given 13 demonstrations at the farms. Four hundred and thirty-

nine visits have been made to help other sheep men, 13 demonstrations have been given, and almost 1,500 sheep sheared.

Many requests were made at several of the demonstration farms for help in marketing wool. These requests were referred to the Department of Agriculture, and a study was made to determine a reliable marketing plan. This resulted in a plan whereby the wool growers could have their wool made into blankets and the finished blankets returned to the growers, each grower selling his own blankets.

Those 275 wool growers who adopted the plan sent their wool to the nearest of eight assembling points (six of these were the demonstration sheep farms), from which the wool was shipped to a Massachusetts mill and made into all-virgin wool blankets. The finished blankets, 70 by 90 in size, were returned to the growers, 1 blanket for each 10 pounds of grease wool supplied, the growers paying \$2.80 per blanket for manufacturing and transportation charges when the finished blankets were delivered. Each grower attended to the sale of his own blankets, most of them selling for \$7.50 per single blanket, although a few sold for less in large lots, — some at \$8 and others at \$10 per blanket. The price being offered for grease wool in the country at the time shipments were made was less than 25 cents per pound. The average price received for all the blankets was approximately \$7.30 per blanket, which returned the farmer 45 cents per pound for the grease wool, an increase of 20 cents per pound over the price offered by country buyers. The wool growers sent in 28,959 pounds of grease wool. Therefore the saving to these growers was approximately \$5,791.80. The wool growers were well pleased with the returns from marketing their wool as blankets.

BOVINE TUBERCULOSIS SITUATION.

Massachusetts is one of two States withholding from its cattle owners and the public the advantages of bovine tuberculosis eradication through co-operation with the Federal government.

The Congress in 1917 appropriated \$75,000 to conduct the work for one year. The appropriation in 1921 was \$2,600,000, to be apportioned to the 46 States doing co-operative eradica-

tion work. These States have 11,545 fully accredited herds with 266,973 cattle, and 96,585 herds containing 1,049,344 cattle have passed one clean test.

The most prominent feature of the Federal movement is the "Tuberculosis-free accredited herd" plan, upon which plan the movement largely depends for its endorsement by the cattle-owning public. Under this plan certain indemnity is paid for reacting cattle which are slaughtered, the owners of which have submitted their herds for official tests applied under Federal or State supervision. This payment of indemnity, however, is contingent upon a like indemnity being paid by the State wherein the cattle are owned. Under existing Massachusetts law, indemnity can be paid by the Commonwealth only for cattle which are condemned by Division of Animal Industry officials, such condemnation to occur as a result of physical examination, the use of tuberculin as a diagnostic agent being in most cases prohibited. As the majority of cattle reacting to a tuberculin test are not cases that can be readily condemned by physical examination, indemnity for such reactors cannot be paid by the State, and for that reason alone no Federal indemnity is available. The Massachusetts cattle owner, therefore, who desires to eradicate tuberculosis from his herd by slaughter of the reactors to an official test, finds himself denied both State and Federal indemnity as partial reimbursement for his losses, and consequently the work of eradication by the "tuberculosis-free accredited herd" plan has not progressed in this State to the extent it has in most other States of the Union, or to the extent it would if Massachusetts laws were more favorable to its progress.

Unaided by State or Federal funds 41 Massachusetts herds, with 1,436 cattle, have become accredited. There are many cattle owners who are eager to take up this voluntary eradication work as soon as the State of Massachusetts makes it possible to secure a portion of the Federal appropriation.

The near-by States are doing an increasing amount of the eradication work, which is drawing buyers of cattle to them for tuberculosis-free cattle. Dairymen are eagerly looking for the time when they may have the opportunity of beginning bovine tuberculosis eradication through encouragement from the State and Federal governments.

POULTRY SITUATION.

Present Poultry Population. — According to the 1920 United States census report there was a decrease in poultry and eggs in Massachusetts from 1909 to 1919. Following are the census figures for these two years: —

	1919.		1909.	
	Number.	Value.	Number.	Value.
Eggs (total production) (dozen)	9,604,000	\$6,051,000	14,145,000	\$4,280,000
Chickens raised	2,401,000	2,953,000	3,212,000	2,411,000
Chickens sold	996,000	1,219,000	1,596,000	1,288,000

These show a decided decrease, about 32 per cent for eggs, and 25 per cent for chickens raised. It must be understood, however, that only farm flocks are included in the report, which means that all suburban or back-yard flocks are omitted. What the result would have been had the entire poultry population of the State been counted is impossible to say; but if the poultry population of the town of Arlington is an indicator of conditions in our cities and suburban districts, the farm flocks fall far short of making up our total. Arlington, having a population of 16,000 to 17,000 people, had a hen population last year of 18,000.

Perhaps a word in regard to the subdivision of flocks in this State will be enlightening. In most parts of the country the farm flocks make up practically the entire poultry population, but in this State the small back-yard flocks, the small suburban commercial flocks of from 50 to 200 hens and the large specialty flocks constitute a very considerable portion of our poultry. The general nature of our poultry work is shown by the above classes of producers, and war conditions are the causes of the decrease in this State. We have good evidence that there was a marked increase in production from 1910 to 1916. In fact, there are a number of places that can be mentioned where the number of poultry kept increased from a few hundred in 1911 to several thousand in 1916. Wilbraham, Halifax and Townsend Harbor are good illustrations. The decrease took place in 1917, a direct result of the war. In a very short time the price of feed increased 100 per cent, and that of poultry and eggs remained practically the same. This, together with the abnormal wages paid in our mills and factories, caused a wholesale reduction, many closing out entirely and others greatly reducing their flocks. The duck business almost ceased,

and the soft roaster business which had flourished for twenty years or more in the vicinity of Rockland was entirely wiped out. Another contributing factor was that rumors that we might not be able to get feed at any price were afloat from time to time.

Had the poultry population of Massachusetts been made up almost wholly of farm flocks, as it is in the Middle West, and farms, too, where the owners are engaged in no other occupation, and where most of the feed is produced, the decrease would not have been so noticeable.

The census report also shows that the number of eggs per hen decreased from 1909 to 1919. If this is true it indicates that the quality of our stock is deteriorating. We do not believe this to be the case. The decrease in eggs per hen in 1919, if there was a decrease, must have been due to a lack of care. The price of feed was high and the tendency of the poultrymen, therefore, was to feed as little as possible or to use feed of poorer quality. Litter was high, therefore less litter. Houses deteriorated, and the owner would spend eight hours per day in the factory and attend to the hens night and morning; under these conditions a low average would naturally follow.

During the past year considerable increase in poultry products was noted in certain portions of the State. It was more noticeable in the eastern part than in the central and western portions. Eggs held up in price very well indeed. There was not a decided reaction toward pre-war prices until the very last of the year. Prices of poultry kept up very well throughout the year, and at the present writing are much higher than during the fall and early winter. The satisfactory price of eggs, together with the drop in value of feeds to pre-war level, kept the producers optimistic and contributed not a little to increased production. Many poultrymen have reported splendid profits. Securing a labor income, even from quite large flocks, of from \$3 to \$5 per hen was quite common among our best producers.

Never before in the history of the Commonwealth have there been more favorable signs of getting our poultry industry on a sound business basis. Many of our already large producers are planning to increase their flocks from 50 to 100 per cent, and there are a number of large enterprises in process of

development. Some of these are projecting plans for several thousand laying hens. It is barely possible that these very large undertakings are not desirable or wholesome; nevertheless, they reflect the general trend of the industry, and we firmly believe that their chances for success are very much greater than in former years, owing to the fact that much progress has been made in the past few years on poultry farm organization.

Our duck industry, of such importance a few years ago, is well on the way to recovery, and the low price of feed should see a revival in this line.

The production of soft roasters, the pride of our State before the war, is showing signs of coming back, and this too should make rapid progress under existing economic conditions.

Our more enthusiastic turkey growers have not lost heart. The fact that a few are succeeding in rearing a goodly number in spite of the ravages of black head show the possibilities of increased production of our Thanksgiving bird, and who knows but what our New England turkey industry may again flourish as in former years.

Some interest has been shown in squab production also.

Facts that lead us to believe in the increase and stability of the poultry industry in Massachusetts are —

1. There is a greater diversity between consumption and production in the State than ever before.

2. The ease with which baby chicks can be secured will increase the number raised on small holdings and back lots.

3. Plans for poultry farms are being projected with more hope of success than ever.

4. Grain prices are nearly on a pre-war level.

5. Statistics show that for a number of years following wars, prices of poultry and eggs have held up well, and that they have, therefore, been produced at a profit.

ANNUAL REPORT

OF THE

DIVISION OF INFORMATION

FOR THE YEAR ENDING NOVEMBER 30, 1921

REPORT OF THE DIVISION OF INFORMATION.

The work of this Division consists principally of collecting and furnishing information about agricultural subjects to farmers and the general public, and of supplying information on special topics which is required in the course of the work of the Department. Information to farmers and the public is supplied partly by correspondence and largely by the distribution of publications issued by this Department, by the Agricultural College, and by the Division of Publications of the United States Department of Agriculture. The preparation of material for publication and for answering special inquiries arising within the Department requires a considerable amount of investigation and research.

INFORMATION SERVICE.

The information service carried on by the Division is directed toward supplying facts that are required by farmers and by other persons interested in gardening, poultry keeping, etc., on a small scale. This information is supplied in various ways, according to requirements. We receive numerous inquiries for general and special information about farming and its various branches, some of which can be best answered by correspondence. In such cases special letters are written replying to the inquiries as completely as possible. It often happens that the inquiry can be better answered by another authority, and in such cases the letters received are referred to that authority: for example, the Agricultural Extension Service, the Agricultural Experiment Station, or some bureau of the Federal Department at Washington.

A considerable variety of questions is raised by persons calling at the office. Sometimes satisfactory replies to such questions can be given by supplying information in printed form. In other instances it is necessary to give the information verbally or consult one of the other divisions. Where such a

course appears advisable the visitor is referred to the college, the experiment station, the Federal Department or the county agent in his county.

The largest volume of information is distributed by means of publications, which include not only those printed for the Department, but also such as can be obtained from the Agricultural Extension Service and the Agricultural Experiment Station, and some farmers' bulletins issued by the United States Department of Agriculture. All these publications are supplied to persons who call at the office, but the farmers' bulletins are not usually sent out by mail because only a small supply is furnished to us for distribution. The demand for publications is steadily increasing, although it varies somewhat in different seasons of the year. Usually it is greatest in the spring and in the early fall.

During the past year the Division increased somewhat its distribution of publications at agricultural fairs. In 1920 information booths were maintained at the Eastern States Exposition, West Springfield, and at the Brockton Fair. Some publications were also distributed at the Three County Fair, Northampton. In 1921 a booth was maintained at the Franklin County Fair at Greenfield, and larger quantities of publications were supplied for distribution at the Eastern States Exposition, Northampton and Brockton. The Division also had several new bulletins which were printed in time to be used at all of the four fairs mentioned, and it was estimated that more than a ton of publications was sent to West Springfield, and nearly three-quarters of a ton to Brockton. The distribution of these publications was practically complete, only a small quantity being returned from any fair to which they were sent. The extension of the service to Greenfield seems to have been highly satisfactory to all concerned. A large proportion of the persons attending this fair are actually engaged in farming, and they were much interested in the publications offered, so that a large number and variety were distributed. The space furnished at Brockton was not wholly satisfactory because it was too small and crowded to afford proper facilities. The Director recommends that during the year 1922 arrangements be made to extend the distribution of publications to at least

two additional fairs, such as the Housatonic Fair at Great Barrington, in Berkshire County, and the New England Fair at Worcester. The distribution of publications at fairs not only renders good service to visitors who are in search of information, but also gives valuable publicity to the work of the Department.

Information on agricultural questions and facts about the agricultural situation have been supplied to the newspapers of the State and to farm publications in the same manner as in the preceding year. The other divisions have been canvassed for items of interest, and have supplied material for special articles on important occurrences.

The Division has been called upon from time to time to supply a speaker for agricultural meetings, and in response to such calls the Director has delivered six addresses and three illustrated lectures. These addresses and lectures were delivered in several different localities, including Mattapoissett and Halifax in Plymouth County, Dedham and Canton in Norfolk County, and Ashburnham in Worcester County.

COLLECTION OF INFORMATION.

The research and investigation work performed by the Division has been directed largely to securing material to complete the book on "Farming Conditions and Opportunities in Massachusetts" which was projected last year. Detailed studies have been made of available data on climate, soils, markets and other important subjects, and the Director has traveled over a large part of the area of the State in order to get a first-hand view of physical conditions and the types of farming characteristic of the several counties. In the course of the study on climate, detailed tabulations have been worked out to show the length of the season in different parts of the State and the variations of rainfall at nearly sixty different places. Sets of questions were prepared and sent out to leading live-stock raisers, vegetable growers, poultrymen, etc., throughout the State. Some very good replies were received, but in general the material was not of sufficient value to justify further inquiries along the same line.

An attempt has been made to secure statistics about Massachusetts agriculture for a long period in order to develop information about changes in agricultural conditions and the shift from generalized to specialized farming which seems to have occurred generally throughout the State. It was found to be impossible to get definite data earlier than 1840, because no previous Federal census included any statistics on agriculture, and there was no general State survey of agriculture until after the Civil War. Some studies of special agricultural subjects were made under State authority as early as 1838, but they do not throw any light on the general agricultural situation.

Statistics were compiled on various subjects, the most extensive compilation being made for a bulletin to be entitled "Agricultural Statistics for Massachusetts and New England," which was compiled largely from the censuses of population and agriculture taken by the United States Census Bureau in 1920. The contents of this bulletin include figures showing the area devoted to the principal crops in all the New England States, and the quantity and value produced, together with data on live stock and live-stock products, the number, areas and values of farms, etc. The statistics for Massachusetts cover all these subjects and some additional subjects which are also tabulated for each of the several counties. Statistics of production were obtained for the State and counties from the United States census for 1840, and detailed tables covering temperatures, frosts and rainfall throughout the State were compiled.

PUBLICATIONS.

This Division does not make up all the publications issued by the Department, but it has charge of them after they have been prepared, securing approval of the Supervisor of Administration for publishing them, performing any editorial work that may be necessary, and determining any questions that may be raised by the State printers. The material for a part of the publications is prepared within the Department, and a considerable proportion is written by authorities outside the Department. Usually the Division endeavors to secure ma-

terial on a particular subject in response to a demand, and to provide material on subjects which appear to be particularly important. The present plan of publications involves the preparation of two series, one of books and one of pamphlets designated as bulletins. Notices and small leaflets of a temporary character are not included in the bulletin series. As projected, the book series will include seven or eight volumes, some of which will be revisions of a series formerly issued by the State Board of Agriculture. During the past year the second book of this series, entitled "Orcharding," was completed and published. A large part of the manuscript on No. 1, entitled "Farming Conditions and Opportunities in Massachusetts," was completed and some illustrations were collected, so that it is probable that this book can be sent to the printers in the spring of 1922. Plans were also made for writing No. 3, on "Poultry," and No. 5, on "Vegetable Growing," but, owing to the difficulty of making arrangements with authorities to prepare the several chapters, none of the text of these books had been completed at the end of the year.

The bulletin series cannot be completely planned in advance, because new subjects are constantly being brought to our attention, while other subjects cease to be important and can then be dropped from the list. It is intended that this series shall include publications on birds, poultry, fruit growing, vegetable growing, agricultural statistics, legislation, and such other topics as require attention from time to time. Some of the circulars and Department circulars formerly issued by the Department and the Board of Agriculture are being revised and included in the list of bulletins, as the old editions are exhausted.

During the year 1921 the Division published one volume of the book series, twenty-three bulletins, and ten miscellaneous documents, including three milk leaflets, three maps of Massachusetts and a trespass poster on cloth. All these were carefully edited. A complete list of these publications follows:—

List of Publications issued during Year ended November 30, 1921.

DESIGNATION.	Title.	Number of Copies.
	<i>Book Series.</i>	
No. 2	Orcharding	3,500
	<i>Bulletin Series.</i>	
No. 1	Outdoor Bird Study	3,000
No. 2	Food, Feeding and Drinking Appliances and Nesting Material to Attract Birds.	3,000
No. 6	The English Sparrow	1,500
No. 9	The Utility of Birds	1,000
No. 11	Back Yard Poultry Keeping	2,000
No. 15	Practical Suggestions for Raising Turkeys	1,500
No. 17	Establishing an Apple Orchard	1,500
No. 18	Renovating Old Orchards	500
No. 19	The Establishment and Maintenance of Peach Orchards.	1,000
No. 20	Pruning, Grafting and Budding	1,000
No. 21	Apple Insects and Diseases, and their Control	1,500
No. 22	Apple Storage on the Farm	500
No. 23	Apple Packing for Massachusetts Growers	1,000
No. 26	Co-operation among Fruit Growers in Massachusetts.	1,000
No. 29	The Home Vegetable Garden	4,000
No. 35	Directory of Agricultural and Similar Organizations, 1921.	400
No. 36	The Organization and Work of the Department of Agriculture.	1,000
No. 37	Digest of Laws Governing Shipments of Nursery Stock.	500
No. 38	Dairy Laws	500
No. 39	List of Useful Books on Agriculture	1,000
No. 40	Massachusetts Farms for Sale	1,000
No. 42	Agricultural Legislation, 1921	300
No. 43	Dairy Statistics, 1921	300
	<i>Miscellaneous.</i>	
Circular	The White Pine Blister Rust	3,000
Directory	Agricultural and Similar Organizations in Massachusetts, 1920 (reprint).	250
Leaflet	Arbor and Bird Day	15,000
Leaflet AA	Child's Food Series — Use Milk	50,000
Leaflet BB	Child's Food Series — Use Milk	50,000
Leaflet O	Food Value of Milk	50,000
Poster (cloth)	Extracts from the Trespass Laws of Massachusetts	2,827
Map (small)	Massachusetts (outline)	500
Map (small)	Massachusetts (outline) with Populations of Cities and Towns.	500
Map (large)	Massachusetts (outline)	500

The editions of the book and the several bulletins aggregated 32,500 copies, yet the supply of publications on hand was less at the end of the year than at the beginning. Nearly 2,500 copies of the book on "Orcharding" were distributed in six months.

The plan for future publications involves the printing of other numbers of the book series as rapidly as material can be prepared and funds to meet the expense of printing are available. Two or three of these books should be ready for publication during the year 1922. It is proposed to print additional numbers of the bulletin series to give information on subjects about which nothing is now available in print, and to print revisions of those already published as the present editions become exhausted. Certain of these bulletins, like the "Directory of Massachusetts Agricultural Organizations," "Agricultural Legislation," and the "List of Farms for Sale" will probably be published at least once a year. Efforts are being made to secure new and better maps, but the expense of publishing some of these will probably be so great as to require an appropriation in addition to the amount regularly allowed for the Division's work.

The demand for publications on agricultural subjects is so large that it is not being met by the agencies now publishing such material in Massachusetts, nor can it be met by Federal publications, because it is impossible to secure a sufficient supply of these publications for distribution.

THE FARM LABOR BUREAU.

Employment Service.

The season of 1921 was quite different from the previous year of 1920 when the farmers found it almost impossible to obtain help. This year the labor market was flooded with skilled and unskilled workers from the industrial field. Many of these, having had previous farm experience, sought farm openings. The farmers throughout the State were able to find help readily, in most cases locally, and without the assistance of employment agencies, also at a much reduced wage. Wages for general farm help, which last year ranged from \$50

to \$75 a month for a single man, averaged from \$35 to \$50 this year for the same work. In some communities farmers were hiring help at a reduced wage, from which the men were obliged to furnish their own room and board. The exceptions to the lowered wage standard were the dairy or other farmers operating on a large scale, or others who had particular labor requirements for which a high wage was maintained. Owing to the scarcity of opportunities, the higher grade workers, such as farm foremen and managers, made few changes of position in the spring, and there was consequently little call for this class of worker.

Three hundred and fifty farm helpers registered and filed applications during the spring and summer months. One hundred of these are recorded as having found employment on farms. One hundred and fifty-four others were referred to employers and co-operating agencies, and it is safe to figure that at least 50 per cent, if not more, of this number found similar employment through these sources. Because of the indirect connection made, through letters between the farmer who lives at a distance and the employee, and the placements through co-operating agencies, there is little opportunity for accurate records. Particular effort has been made to find suitable places for those men, who, through training or natural inclinations, wish to go into agriculture permanently. There are many young men who, having sufficient capital at their disposal, wish to gain practical experience as farm laborers before investing in the purchase of a farm. Such men, although inexperienced at the outset, usually make earnest, intelligent workers, and prove an asset to the farmer for whom they are working. Several such men have been among those who found farm openings.

This is the first year since the war that the farmer has found labor sufficiently plentiful to make his own selection at the figure he could afford to pay.

Listing and Advertising Farms for Sale.

Owing to the large number of calls which have come to the Department of Agriculture, many from without the State, regarding the purchase of abandoned farm lands, it was deemed

advisable to list farm properties for sale within this State and issue this list in bulletin form. The first of such bulletins since 1911 was issued in May, 1921.

This bulletin is intended as a handbook for farmers, advertising purchasable farm lands, putting them in direct touch with owners, and eliminating all unnecessary costs to prospective buyers and sellers through fees exacted by agents; also serving to correct the widespread impression outside of the State that Massachusetts still offers abandoned farms for reclamation.

Owing to the high freight rates and increased values of western farm lands, the advantages of Massachusetts farms were set forth through a series of advertisements in several of the leading agricultural papers during the spring of 1921. As a result of this there were 300 requests for literature relative to farms for sale, 200 of these coming from farmers of the Middle West. Twenty of the farms thus listed have been reported sold.

High School Boys on Farms.

The work of placing high school boys on farms during the summer season was so successful in 1920 that the Department recommended its continuance during the past year. There was, however, no such labor shortage in the spring of 1921 as there had been a year previous, so that while a small appropriation was made in the first appropriation act to allow for preparatory work during the winter and early spring, it was deemed unnecessary to make any further appropriation. It was, therefore, impossible to conduct camps for boys or to place individual boys on farms during the spring and summer. Numerous applications were received from individual boys, from school authorities in cities and larger towns, and from farmers in various localities, but under the circumstances these applications could not be met. The camp formerly conducted under State authority at Hatfield in the Connecticut valley was opened by the teacher who had supervised it for the State, and was continued throughout the summer under a private arrangement. The abandonment of this undertaking seems to be highly regrettable, because it was of direct advantage to

many farmers and to many boys who were aided to find pleasant and profitable employment during their summer vacations. The indirect value of the work was also considerable because it gave hundreds of city boys an acquaintance with farming work and farming conditions which they could not have obtained otherwise, and in some instances was a means of turning these boys toward agricultural work and toward the systematic study of agriculture in the Agricultural College and elsewhere.

ANNUAL REPORT

OF THE

DIVISION OF MARKETS

FOR THE YEAR ENDING NOVEMBER 30, 1921

REPORT OF THE DIVISION OF MARKETS.

THE DIVISION OF MARKETS.

Until recently more attention has been given to the problems of producing farm products than to those of marketing them, and it is probably true that production is now carried on more efficiently and scientifically on the best farms than marketing is effected after the producer's product leaves the place where it has been grown.

Specialization in farming as well as in other lines of business has emphasized the necessity of an adequate system of distribution. However, generally speaking, the situation is not so discouraging when the comparatively rapid recuperation from the high prices of our recent war is compared with the long period necessary for recuperation after the Civil War. This recovery is probably due to our present-day improvements in transportation and in the development of methods of distribution which have enabled the plentifully supplied areas to send their goods to those not so well provided for.

The problem of marketing is associated with production and consumption, and involves all the details of the physical distribution of the product to the ultimate consumer. The producer, middleman and consumer are concerned alike with the inefficiencies, duplications and wastages occurring in their system of marketing.

Deficiencies in the distribution system and methods now commonly employed began to attract public attention only a few years ago, so that the study of these problems is yet in its infancy. Marketing problems are large in scope, and it is evident that within the time during which they have been given special attention they have not been completely stated or defined, but enough has been done to demonstrate that the

processes of marketing and distribution can be made much less wasteful and more satisfactory than at present. Many people are now calling attention to the fact that the price paid to the producer for his goods and the price paid by the consumer for the same goods are much farther apart in many instances than appears reasonable.

Our present national marketing scheme, of which we are only a component part, involves the assembling, grading, transporting, storing and ultimate distributing of commodities, all of which are essential operations. Our concern is with the inefficiencies and wastages incidental to these operations.

A study of the subject has proceeded far enough to make evident the fact that the spread in prices between producer and consumer is not wholly due to unwarrantable profits taken by jobbers, wholesalers and retailers, but largely to waste and loss naturally resulting from inadequate methods.

As a result of the nature of this problem official agencies similar to our Division of Markets have been created by the United States Department of Agriculture and by many States of the Union to study marketing problems, to recommend improvements, and to enforce laws already enacted or which may be enacted to regulate marketing practices. The work of this Division, now in its second year, has dealt with the following subjects, and is hereafter discussed more in detail.

MARKET NEWS SERVICE.

Considerable progress has been made in the distribution of market news by the Division of Markets. Timely information as to supply, demand and price and pertinent remarks as to market conditions are of value to the producer, middleman and consumer. The Division is particularly pleased with the growth of the distribution area of its market news through the very fine co-operation displayed by the press. The dissemination of price information through the daily newspapers is one of the most efficient and practical means of getting this information before interested parties, and it is hoped that we may be privileged to rely in the future to a greater degree on the co-operation which we have enjoyed during the past twelve months.

The Boston Farmer's Produce Market Report, a sheet containing wholesale prices received by farmers on the Boston farmers' market on fruits and vegetables, is mimeographed daily and sent to the mailing list of some 400 farmers, the recipients furnishing the postage. On Thursdays the Brighton Live Stock Market is included as well. This information is also sent out daily on the Associated Press wire. The "Manchester Union," the "Lowell Courier Citizen" and the "New Bedford Morning Mercury," carry our Boston market news.

The Boston report is published during the entire year, while the Worcester and Springfield wholesale produce markets were covered by market reporters from July 1 to December 1. The Worcester mailing list was composed of 100 names who received the daily mimeographed sheet, and the information was also published in two newspapers, the "Gazette" and "Post."

The Springfield produce market news was published in the "Union" and "News," and a weekly retail price report was also published in these papers. It was the practice of the Springfield reporter to summarize the news of the week and this summary was published in the Sunday issues of the "Springfield Union" and "Springfield Republican." During the latter part of the reporting season the Springfield produce market reports were also published in the "Daily Hampshire Gazette," Northampton, and the "Greenfield Recorder," Greenfield. On Tuesday the Worcester bulletin carried the Boston and Springfield markets, whereas the Boston bulletin published the Worcester and Springfield prices on Tuesday and Thursday, this information being relayed by telephone on these days. An urgent request was received from the Berkshire County agricultural agent at Pittsfield for a market news service, but to our regret we were unable to render such a service to this locality, owing to the fact that there were insufficient funds.

A weekly circular quoting Boston retail prices collected from the various types of retail stores, including range of prices on vegetables, fruit, dairy products, meat and fish products, indicating weekly demand for certain commodities and what is new on the market, is also published by this Division. A paragraph in this report is devoted to brief market news items covering crop outlooks, predicted shipments of food, supply, etc., ending with a new recipe in season or a practical economi-

cal suggestion. This report is becoming very popular, being used extensively among owners of roadside markets and others interested in the selling of farm products, as well as retailers and consumers living in and around Boston. Postage for this report is required of all who receive it.

The most outstanding progress made in a national way in the dissemination of market news was the installation of a radio market news service by the Bureau of Markets and Crop Estimates. Market news relating to live stock and grain is now sent out each day from radio stations at such points as Washington, District of Columbia, Bellefont, Pennsylvania, St. Louis, Missouri, and Omaha, Nebraska. It is expected that this system of reporting news will extend into the field of hay, feed, seeds, fruits and vegetables, and it is not unreasonable to suppose that the time is not far distant when our State may be in a position to utilize this information for the benefit of our people.

Through our mailing lists and press contacts we were able during the past year to give wide publicity to the reports issued by the crop statistician of the United States Bureau of Markets and Crop Estimates, who is co-operatively employed by our Commonwealth. These reports comprise crop acreage, production, condition and special reports on such matters as insect injury, frost damage and ice breakage.

Our farmers, more especially those engaged in intensive market gardening, have expressed a desire for accurate information covering the acreage of production and time of harvesting of competing crops in competing areas, together with periodical progress reports on these crops. This information apparently would be very valuable to our local men, whose early market is encroached on by the southern competitor. In a like manner a census of farm products in Massachusetts alone giving the acreage of each crop, especially in the market-garden and fruit areas, would be of assistance to our men in eliminating some of the present risk in marketing. Work along this line has already begun with figures for onion acreage recently issued.

Market reports describing a set of facts so far in the past as to have no bearing on the present market conditions are

obviously valueless. Rapidity of dissemination is an essential to efficient market reporting service, and we feel that dissemination through the agency of the press has effected some improvement in this direction during the past year.

Likewise market quotations too general in description or wide in range of price lose their value to the grower who markets his produce carefully. Certain fruits and vegetables have a tendency to arrive on our markets classified more or less into grades. For instance, take the case of asparagus. When the appetite for asparagus is good, during the early part of the season, less attempt is made at grading, all sizes and conditions arrive in the same package, and one price is usually quoted. Then as the season advances, the supply increases and the market becomes settled, the consumer's taste becomes more critical, and in order to meet this demand an attempt at grading is made, more or less successfully. During this period of heavy supply there may be a wide spread in price, owing to the fact that poor and good, graded and ungraded, carefully packed and poorly packed, are all contained in the same range of price. A quotation stating such a spread would be of little or no value to the farmer, whereas a classification of these commodities as to quality, size and condition, and a description of this classification, with prices quoted for each item, ought to convey to the careful marketer a more accurate indication of market conditions. Some system of this character we hope to put into effect within the coming year.

COMPILATION OF CROP DATA AND MARKET NEWS.

Data relative to the source of supply of Massachusetts fruit and vegetable markets have been gathered during the past year, and the information prepared on our maps for the preceding year has been brought up to date. Some of this information has been published and distributed to those receiving our price reports. Furthermore, these maps, showing the source of supply of Massachusetts markets, are kept up to date by the addition of information obtained from trade or official publications about growing conditions, acreage, production and other important facts affecting the crop situation.

The demand seems urgent for a complete study of competing areas both within and outside the Commonwealth, and their progressive crop conditions, as these areas have a direct influence in many instances on the development of our local agriculture. We hope to work out this problem in conjunction with the local representatives of the United States Bureau of Markets and Crop Estimates assisted by our reporters situated in large market-garden areas.

Prices of farm products on the markets of the northeast are kept on file, as well as crop reports relating to condition, acreage and production in Massachusetts and New England.

STANDARD GRADES.

The movement among our onion and tobacco men toward the standardization of grades for their products, and desire for the establishment of a certification and inspection service, marked the past year's progress of our farmers on standard grading. The facilitation of marketing their product, together with all the remaining advantages pertaining to a graded product, seem to be the moving considerations with our onion growers, whereas the difficulty of developing a warehousing and financing system without the aid of standard grades has impressed the tobacco men with the necessity of tobacco standardization.

An investigation into the present methods of marketing asparagus was conducted for the purpose of assisting the Massachusetts asparagus growers in arriving at possible standards for grading and marketing Massachusetts asparagus. It is interesting to note that among the leading producers of those commodities which lend themselves to standard grading we find the adoption of individual grading systems, witness asparagus, lettuce, cauliflower, cucumbers, tomatoes, etc. The advantages of grading are thus recognized among our growers, but under present conditions are likewise limited to the individual. Establishing standard grades for commodities extends to the community the advantages now accruing to the individual, and the reputation for standard graded goods obtained by the group is found to reflect to the individual's benefit.

It may be well to keep in mind while considering this subject, that it is advisable to have State standard grades conform to United States grades as closely as possible, for our present interstate exchange of commodities is so widespread that national standards seem to be essential to the full realization of the benefits of a grading system.

The question, then, presents itself as to how the advantages of a grading system may be obtained without interfering with one's present rights and privileges, and the following is submitted, not as an answer, but rather as a suggestion of a basis upon which this problem may be worked out.

The promulgation by those persons primarily interested of standard grades which may be revised from time to time as required, the recognition of one's right to use the grades or not as he may choose, the establishment of an inspection service to insure the maximum value and most beneficial results of grading and the requirement of strict observance of the grading specifications when used, seem to be principles upon which such a system may be devised. A possible means of effecting enforcement is the revocation of the right to use the grading system when it is proven that the offender has not observed its specifications. Another method is that of rendering violations of grade specifications subject to penalties. It is universally recognized that without strict observation of grading specifications a grading system is without value. This program in brief puts the value of grading fairly up to the farmer. If he chooses to take advantage of its benefits he may adopt the grading system, assuming at the same time the obligation to his fellow farmers of observing its provisions. If, on the other hand, he does not desire to grade, he may sell without observing any grade requirements.

The processes of marketing are attracting the attention of our farmers. There is prevalent a realization that this side of agriculture has been unduly neglected in an effort toward greater production. Among the marketing functions of assembling, grading, transporting, storing and selling, the operation of grading seems to be commanding the greatest interest. Producers are beginning to realize its advantages to themselves and to their industry.

Among the economic advantages of grade classification are: elimination of fraud and deception; prevention of waste; prevention of market demoralization; encouragement of better production; establishment of trade confidence; reduction of handling costs; reduction of the buying risk; classification for market demand; creation of a steady demand; reduction of expensive sorting at market centers; widening of market outlet; elimination of expensive inspection; and facilitation of better financing and warehousing systems. All these are closely associated with the discussion of point of shipment inspection, as most of these economies realize their maximum benefit through the establishment of shipping point inspection, which means shipping point grading.

CERTIFICATION AND INSPECTION.

Inspection by State or national officials having no financial interest in the deal, but rather an interest in the strict observation of grade requirements, not only assures a satisfied receiver, but tends to eliminate the wastage in transportation of that portion of useless goods upon which a transportation charge would otherwise be made. This cost, of course, goes into the price charged for the article, which increases the price to the consumer, results in a reduction in demand and is an obvious wastage.

Of course, subsequent spoilage may often occur in the handling of fresh fruits and vegetables, such as that caused by overheating cars in the case of potatoes, or loss from improper icing in the case of more perishable commodities originating in the South and West. However, the initial culling out which occurs at point of shipment is of great value from the point of view of transportation saving alone.

Market depreciation and poor prices are too often caused by an oversupply of poor stuff, for which there is no market demand. This stuff may move slowly under such circumstances and of course for an unsatisfactory price, when a similar supply of properly graded produce of good quality might move readily. This important feature is often overlooked at our points of production.

Taken from the point of view of the whole operation of marketing, most of the operations of grading can be accomplished to best advantage at the point of shipment. Graded goods move more directly through the channels of trade, bring a premium, and give satisfaction because they are graded. Distribution is thereby facilitated and movement of goods accelerated.

The reputation of a production center is gained largely through the quality of the products which it places on the market. Point of shipment inspection, which tends to assure trade satisfaction through the elimination of poor unsalable goods from the market, helps to create a good trade reputation, with the resulting financial benefits to the locality.

While discussing this matter it may be well to note that the United States Bureau of Markets and Crop Estimates maintains a fruit products inspection service, one of the offices of which is located in Boston. This service provides a means whereby shippers or receivers interested may have upon application a full, accurate and disinterested report of the condition of their interstate shipments upon arrival at market. Permissive grades, mainly only tentative, have been promulgated by the United States Department. In addition to the facilitation of trade dealings through the establishment of a common language, there is established a basis upon which to make inspections. Recommended grades for potatoes, sweet potatoes, northern grown onions, Bermuda onions, strawberries, grain and cotton, and proposed grades for apples, cabbage, fresh tomatoes, head lettuce (eastern section), rough celery, cucumbers, washed celery and asparagus have been established, most of which have been forwarded to persons on our mailing list in order that they may be acquainted with the specifications of these grades, and that they may express themselves as to the application of these grades to our local conditions.

APPLE GRADING LAW.

The apple industry underwent a very disappointing season. A set of buds and blossoms which gave promise of a good crop received a severe setback from late spring frosts. Middlesex and Worcester counties and parts of Hampshire County suf-

ferred the heaviest damage. While the decrease in yield due to frost has meant a serious financial loss, it seems rather trivial compared to the blow dealt to fruit growers in the eastern half of the State by the ice storm of November 28 to 30. Damage from this source is not easily computed, as its effect will be felt for many years. The bearing surface of many old trees was reduced from one-third to one-half. Trees in prime-bearing age did not lose nearly as many bearing branches, but many large limbs were broken, leaving them in a weakened condition. Young apple trees were damaged but little.

The local Massachusetts commercial apple crop for 1921, according to final estimates, is 172,000 barrels compared with 375,000 barrels for 1920. The hill towns of Franklin County, the largest wholesale shipping section, were fortunate in having a 60 per cent yield.

Unprecedented conditions prevailed in Franklin County during the apple-shipping season of 1921. The shortage of apples throughout the State and country, together with the fact that nearly all of the orchards in this section had escaped serious damage from the spring frost, created an unusual demand for Franklin County apples. This resulted in a large influx of new buyers. Many of these came with auto trucks and purchased in bulk, thus eliminating the grading of a large part of the crop and deflecting the shipment of probably half the crop from the railroad to the highways. The brisk demand thus created kept prices at such a high level that the large apple handlers, who usually take nearly the whole crop, bought comparatively small quantities. There were therefore no outstanding buyers, but rather a large number of small buyers. Many of these were peddlers from central and western Massachusetts cities speculating in apples for the first time. These new buyers, some of whom were financially irresponsible, and nearly all of whom came to the county only because they were unable to obtain apples elsewhere, raised the price to the farmer somewhat for the present season. The discouraging effect which their presence had on the large wholesale concerns and other legitimate buyers, upon whom the growers depend for their usual source of distribution, may tend, however, to offset any increased value which has accrued from this year's crop.

The quality of fruit was very variable. Sooty blotch was much more prevalent than usual, particularly in the Colrain section. Scab was bad in a few sections, but did less damage generally than last year. On the whole, quality was below normal.

Prices were the highest ever reached in the county. Most sales were made before picking was completed. Nearly all lots were bought orchard run, prices ranging from \$4 to \$5.50 per barrel. As usual, the grower furnished the barrel and did the packing, in most cases having the assistance of one man furnished by the buyer. Prices remained quite steady after a figure had been established by the first few sales.

Prices of cider apples reached the high mark of \$1.25 per one hundred weight.

Owing to the fact that such a large quantity of the apples was taken out by buyers who intended to sell at retail, a large part of the crop was shipped out without grading, or in barrels marked "Ungraded." The best lots, and that part of the crop which was bought by the regular buyers, were graded A and B.

Where grading was attempted, there were very few cases where the law was not complied with. Some lots were found below grade at the packing houses, and on these the marks were changed before shipping. The inspection work has directed a good deal of attention to the facing of the "ungraded" pack. Very little criticism can be made of the packing in this respect.

Barrels were in good supply, but of rather inferior quality. Most of the supply has come from local mills, with the exception of a few cars of New York barrels shipped in by one of the buyers and sold to growers. Fewer wire hoops were used than in the previous year. Prices of barrels ranged generally from 65 to 75 cents.

Much of that part of the crop which went out on trucks was taken in open boxes. Other than these there were, to our knowledge, no shipments made in boxes.

In view of the unusual conditions which have prevailed in regard to shipping, the tabulation of figures on carlot rail shipments is not a very satisfactory way of showing the distribution of the crop. A study of these figures and a com-

parison of some with those of last year is, however, quite interesting.

New York City, with a total of 35, leads in number of cars received. These shipments represent apples offered for immediate sale. Shipments to Worcester, numbering 18, were to new buyers, and all went into storage. Boston receipts, totaling 13 cars, were light, due to the druggy condition of the Boston market resulting from heavy receipts of Maine and Nova Scotia apples. The Providence total of 11 cars is quite striking as indicative of the inroads made by the auto truck. These were all shipped by one buyer who takes about the same number of barrels each year. This buyer used auto trucks quite extensively this year, shipping 80 barrels to the load, making his rail shipments less than half of last year. Ballston Spa shipments, totaling 10 cars in comparison to 43 of last year, show the decrease in amount handled by one of the largest buyers. Another striking figure showing the decrease in number of barrels handled by last year's largest buyers is the Lockport, New York, total of 6 cars, representing total shipments of this firm which last year handled about 75 cars.

Shipments by auto truck can, of course, only be estimated, but the consensus of opinion through the county seems to be that the quantity thus shipped would equal that going out by rail. Rail shipments totaled 135 cars, and the average carload was 180 barrels (18 less than last year), making a total of 24,300 barrels by rail. Approximating the auto shipments as an equal number makes a grand total of 48,600 barrels shipped from the county.

Cider apple shipments were very light, totaling only 7 cars. Peddlers with trucks took out so many apples which ordinarily would have gone into cider that the local mill was obliged to go to points outside the State for its supply.

STANDARD CONTAINERS.

The passage of a bill entitled "An Act establishing a Massachusetts Standard for Boxes and Half Boxes for Farm Produce sold at Wholesale" established containers on the basis of the United States volume standard of 2,150.42 cubic inches, which

is the present basis of determining these standards which have become law, and also of proposed legislation now before Congress for the standardization of hamper, split and round stave baskets.

It is hoped that the present law, although permissive, will effect the general adoption of the one standard box. As a result of this legislation (chapter 248, Acts of 1921) there was also passed chapter 8, Resolves of 1921, designating the Department of Agriculture and Division of Markets, jointly with the Department of Labor and Industries and Division of Standards, to conduct an investigation relative to the bushel weights of fruits, vegetables and other commodities, and to make such recommendations for legislation in relation thereto as may be necessary, together with any other recommendations for legislation that will tend to establish a more satisfactory basis for the retail trade in said commodities.

FARMERS' MARKETS.

While along the public highways the roadside markets flourish, the so-called farmers' public retail markets (a war-time expedient), usually located in the central part of the city, are gradually dying out. It is quite apparent that if no inducement can be offered to the producer that represents an improvement over his present marketing method he is not disposed to spend two days a week selling his produce at retail.

On the other hand, the consumer without the added inducement of lower prices does not regard the cash and carry system favorably. Without a demand on the part of the producer and consumer alike, the business of the public market diminishes.

The reason for success attained in a few instances by some of the Massachusetts farmers' markets is twofold: first, organization, — *e.g.*, the South Shore Farmers' Market Association of Quincy and the Berkshire Vegetable Growers' Association of Pittsfield; second, location in a neighborhood where there is lack of competition in selling fresh produce.

Difficulties this year arose from a short fruit crop and lack of money among buyers. Three of the Boston public markets reported a large increase in number of buyers, but volume of business remained about the same.

Roadside selling, a newer project, is still on the increase, but with the continuance of the general practice of asking prices equivalent to the retail store prices the downfall of the roadside market is predicted. There are some, however, who are building up a permanent trade by selling quality products at attractive prices. Stands thus operated may look forward to a bright and prosperous future, because they are being appreciated by the buying public which frequents the automobile highways.

INVESTIGATIONS OF COST OF DISTRIBUTION.

We have been enabled to begin laying the groundwork for cost of distribution studies in Massachusetts through the assistance given by the Bureau of Markets and Crop Estimates of the United States Department of Agriculture, which has furnished office help to work with the investigators whom the Division has been able to put in the field. These studies are fundamental to a clear conception of the charges and costs entering into the marketing and distributing of our products as well as to their allied problems. It is hoped that this preliminary work which is now being carried on by experienced investigators will lay a foundation for future work.

In an undertaking of this kind little more than the analysis of the situation and the establishment of the necessary contacts, together with the outlining of a program of action, can be hoped for in the time which we have been able to devote to it. However, the present progress of this work indicates that not only will a foundation for future work be organized, but much of a real nature will be accomplished before July 1, 1922, the date marking the close of our present co-operative arrangements. During this period we are to receive the assistance of an experienced clerk furnished by the United States Bureau of Markets and Crop Estimates, who will assist the investigators in their respective projects.

Our activities in this work have been confined to the two major agricultural crops of Massachusetts, — onions and apples. On July 1 a project was undertaken, the purpose of which was to acquire facts relative to the costs entering into the distribution of Connecticut valley onions. The objects of this

investigation were to determine the range of fixed and variable costs entering into grading, buying, loading and shipping or storing and shipping, freight and drayage charges, wholesale, jobbing and retail margins, together with the determination of wastes in the marketing process, and the specific fixed and variable costs entering into the storage of onions either in the valley or in consuming centers. In conjunction with this, a long-time analysis of the financial risks involved in the onion-storage business is being made. Preliminary studies for cranberries have also been made.

A project involving the costs entering into marketing of the Massachusetts Baldwin apple crop has for its objects and line of procedure practically the same details as enumerated above in the case of the onion crop. Recommendations leading to improvements in the handling of the Massachusetts Baldwin apple crop, deduced from a study of crop-handling methods in our Commonwealth, may be of assistance to our farmers, as well as the information regarding normal margins received by the various handlers connected with the marketing of this crop.

The third project has to do with the investigation of costs entering into the marketing of Maine potatoes in Massachusetts. The objects of this investigation, while outlined roughly in the same manner as the apple and onion investigations, also include the determination of fixed and variable costs entering into the storage of potatoes in consuming centers, together with a long-time analysis of financial results involved in the potato-handling business.

Information regarding the normal margins received by those connected with the marketing of this commodity, together with data pertaining to the necessary costs entering into the marketing of Maine potatoes, is expected as the result of this work. Recommendations for improvement in the handling of Maine potatoes in Massachusetts may also be deduced from a study of handling methods.

The fourth division of work comprises the development of a program of study of Boston's perishable produce market, the object of which is to determine what the present situation is, what the problems are, what has been done in the past, and what should be done in the future regarding the marketing

conditions of perishable products in Boston. Included in this investigation is one of a more specific nature, comprising a study of the wholesale jobbing costs of handling fruits and vegetables in the Boston market, the objects of which are to determine the range of fixed and variable costs incurred in conducting a wholesale, jobbing commission, or combined wholesale or jobbing business, in the Boston produce market.

The work outlined above is preliminary to a thorough study of marketing costs which should be conducted by our State in order that we may have at hand adequate facts on which to base the future progress of our marketing work.

CO-OPERATIVE RELATIONS.

Progress has been made during the past year in the extension of our joint relationships with agencies in public work similar to our own. In this respect the United States Department of Agriculture through its Bureau of Markets and Crop Estimates has figured prominently and has thus assisted in the promotion of at least three specific projects, — namely, studies of the cost of distribution, reporting Massachusetts crop conditions, and furnishing market information with respect to prices and amounts received on goods shipped into Boston from out-of-State sources, as well as current prices upon the local live-stock market at Brighton. The Boston Chamber of Commerce has made available price figures on hay and grain which are distributed to our farmers.

The splendid co-operation of the press in Springfield, Worcester, Northampton, Greenfield, New Bedford and Lowell, together with the Associated Press of Boston, has greatly extended the scope of our market news activity.

Figures of the quantities of foods stored within the Commonwealth are secured jointly with the Department of Health, while a legislative resolve brought about a joint investigation with the Department of Labor and Industries and Division of Standards relative to the weights of fruit and produce, etc., contained in a standard Winchester bushel.

Co-operative relations are maintained with the Department of Economics at the Massachusetts Agricultural College, with

the aim of being of mutual assistance in our work along marketing lines. The good offices of the Worcester County Farm Bureau and the Hampden County Improvement League made possible the publishing and dissemination of market reports in these two cities.

INFORMATION ON MARKETING.

We are always pleased to assist individuals, especially through their organizations, in the problems constantly arising, and urgently request those having an interest in Massachusetts marketing to express their ideas freely with regard to methods of advancement, as marketing work is yet in a development stage, and such suggestions will undoubtedly be a valuable guidance.

The Division has been represented at over fifty meetings at which marketing subjects have been discussed, and several articles have been published to promote this interest.

The exhibit work of the Division this year was confined to a display at the Eastern States Exposition, Springfield, Massachusetts. One end of the building, devoted to the exhibit, was transformed to represent a market window display of Massachusetts grown products intended to demonstrate the attractive manner in which our fruits, vegetables and manufactured fruit and vegetable products may be displayed, the demand for them thus increased, and Massachusetts agriculture correspondingly benefited. The interest aroused by this movement is evidenced by the fact that twenty-three retail stores in Springfield entered a competition during the week of the exhibit for the best display of Massachusetts fruits and vegetables. A model designed to show one manner of constructing a cellar storage for apples with an overhead room for packing and storage of supplies was made a part of the exhibit. One side of the exhibit room was devoted to a display of standard grades and educational matter in relation thereto. This exhibit also contained the current price reports issued by the Division of Markets and a chart entitled "Who Gets the Money?" showing the manner in which a 25-cent purchase of onions is divided among those rendering the marketing service. The American Railway Express Company co-operated by putting on an attractive and

instructive display for the purpose of reducing the wastage caused by improper shipping methods. Incidentally, egg losses amounted in 1920 to \$1,287,000, most of this loss being due to improper packing and handling methods.

REVIEW OF MASSACHUSETTS CROPS IN 1921.

The crop season of 1921 opened quite early, and spring farm work began sooner than usual; but April was cold and slowed operations down to normal. Repeated low temperatures at the end of winter and during spring months killed many fruit buds and cut down the apple crop over the State.

Drought prevailed during May and most of June over most counties. Heavy rains, especially in eastern sections, came at the end of June and in early July, but rainfall after that was barely sufficient to allow fair to good crop growth.

Crops adversely affected by weather, and consequently of short production, include apples, hay, pastures, onions and cranberries. Grain crops gave fair yields, while corn turned out better than average, due to sufficient heat and a long season for maturing and ripening the crop.

Under legislation enacted during the sessions of 1920-21 in the New England States the New England Co-operative Crop Reporting Service has been established since July 1, 1921. In this service the six States here, through their departments or boards of agriculture, co-operate among themselves and with the United States Department of Agriculture in conducting the joint service through one central organization. The purpose of this service is to supply to all concerned the most trustworthy and timely information possible regarding crops and live stock. Important extensions and improvements are to be made during 1922. Producers, dealers, others concerned and consumers are giving more and more study to crop production and market information, as well as to all influences bearing upon the supply and demand sides of the market.

The following figures on acreage and production of crops are reported by the United States Bureau of Markets and Crop Estimates as of December 1, 1921. They are based on the United States Census of 1919, which has lately become avail-

able. Some changes are made from preliminary figures issued earlier.

Apples were a small crop and poor in quality. The entire crop is estimated at 1,125,000 bushels compared with 3,187,000 shown by the census for 1919. Commercial apples are estimated at 172,000 barrels compared with 375,000 in 1920, and 335,000 in 1919. The severe ice storm at the close of November destroyed an important part of the older trees throughout the State, with a few exceptions. Young trees suffered less. Four to five years will be required to replace the bearing capacity of orchards.

Peach buds escaped most of the spring freezes and produced a good crop, estimated at 185,000 bushels compared with 213,000 shown by the census for 1919. Peach trees suffered heavy loss from the ice storm. Much work is being done to repair both apple and peach orchards.

The season, as regards weather and insects, was unfavorable to cranberries. The crop is estimated at 165,100 barrels compared with 279,500 in 1920 and the twenty-year average of 268,230.

Area of corn for grain is put at 29,000 acres, about the same as in 1919; average yield per acre, 48 bushels; production, 1,392,000 bushels. Area of ensilage corn is 24,000 acres; average yield per acre, 12 tons; production, 288,000 tons.

The census reports 409,843 acres of all tame hay in 1919; average yield, 1.3 tons; production, 533,400 tons. Estimates for 1921 are: area, 423,000 acres; average yield, 1.25 tons; production, 528,750 tons.

Oats for grain in 1919 are reported by the census thus: area, 9,533 acres; average yield, 30.2 bushels; production, 287,881 bushels. Berkshire County produces over 50 per cent of this crop. Estimates for 1921 are: area, 9,000 acres; average yield, 31 bushels; production, 279,000 bushels.

Census figures on onions include those for home use, those for sale green, and the important crop of late onions in the Connecticut valley. Total area, 1919, 4,411 acres; average yield, 340 bushels; production, 1,499,740 bushels. Estimates on the Connecticut valley late crop: area, 1919 and 1921, 4,000 acres in round figures; average yield, 1919, 340 bushels; 1921, 260

bushels; production, 1919, 1,360,000 bushels; 1921, 1,040,000 bushels. Adverse weather and insects in 1921 stopped nearly all growth of the crop when it was about 60 per cent made, and heavily cut down production and quality.

Area of potatoes in 1921, 29,000 acres compared with an estimated total in 1919 of 31,000. A fair to good average yield resulted in 1921, and production is put at 3,335,000 bushels compared with the 1919 short crop of 2,790,000.

Tobacco area: 1919, 9,800 acres; 1920, 10,000 acres; 1921, 10,180 acres. While the 1921 crop is mainly of high quality it is light in weight. Until more of it has been handled and weighed satisfactory estimates of yield and production cannot be made. Acreage of Shade tobacco has been gaining steadily since its introduction some ten years ago, and the total is now 1,622 acres, while the total for New England is 7,382 acres. Havana stalk tobacco has lately been giving place to Broadleaf, which now has an area 22 per cent as much as Havana.



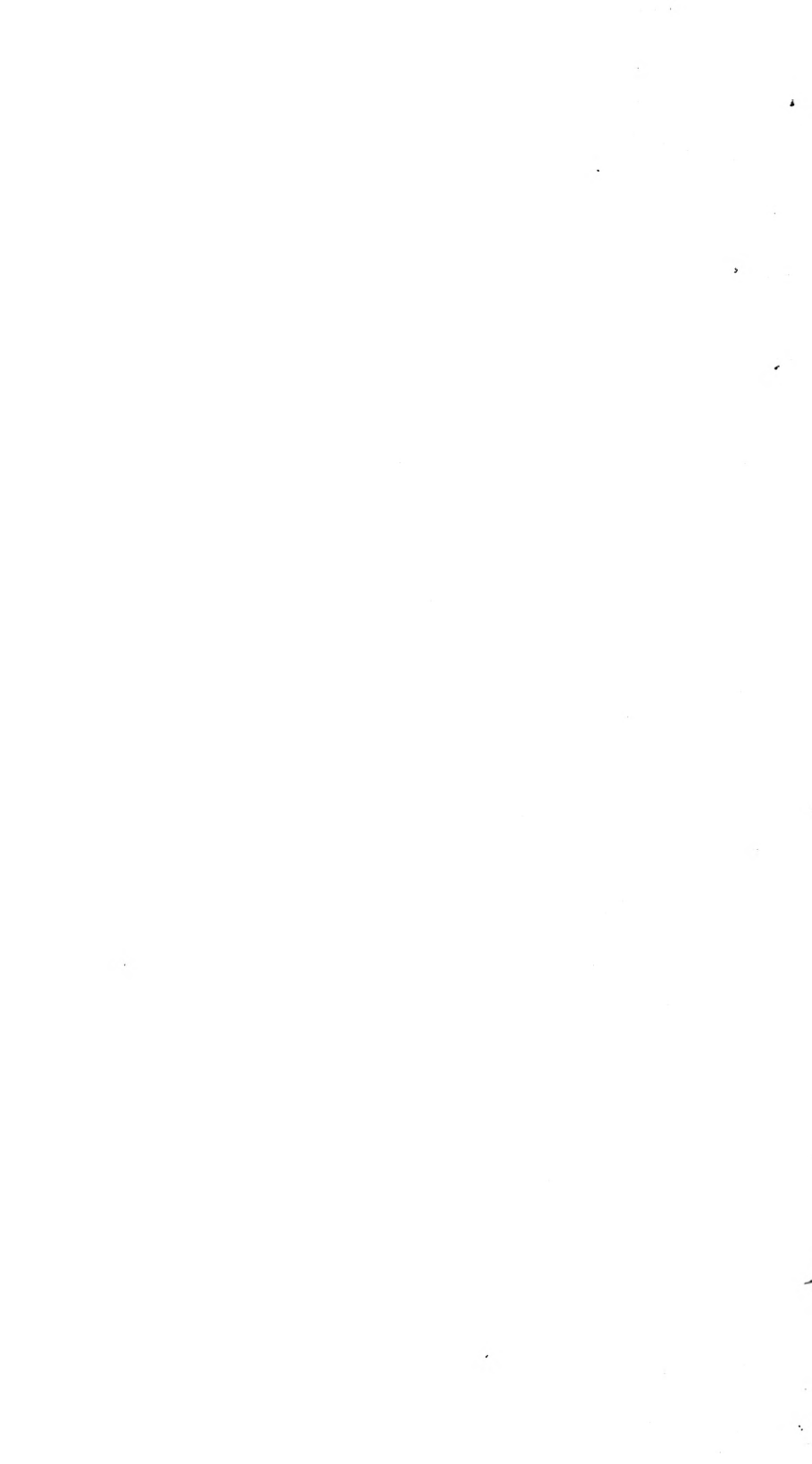
This shows what happens to some of our non-game birds. These birds were killed by a foreign lawbreaker before 9 o'clock in the morning, — four Flickers, eight Robins, four Catbirds, two Blue Jays, one Thrasher, one Sapsucker. (Photograph by Wilbur F. Smith, South Norwalk, Connecticut.) (See page 70.)

ANNUAL REPORT

OF THE

DIVISION OF ORNITHOLOGY

FOR THE YEAR ENDING NOVEMBER 30, 1921



REPORT OF THE DIVISION OF ORNITHOLOGY.

PUBLICATIONS OF THE YEAR.

The demand for the publications of this Division has increased so much, particularly from regions outside Massachusetts, that it has become impossible for this office to meet it. Many individual calls have come from long distances, each requiring hundreds of copies of different papers for schools, members of the Boy Scouts, Girl Scouts, bird clubs and other organizations. The requirements of Massachusetts people will exhaust all the editions that we are likely to be authorized to print. Under these circumstances the Massachusetts Audubon Society, 66 Newbury Street, Boston, Massachusetts, has undertaken to supply some of these publications at cost to people outside Massachusetts who wish them in quantities, and already the society has reprinted Department Bulletin No. 1, on "Outdoor Bird Study," and Bulletin No. 9, the "Utility of Birds."

Following is a list of the prints and reprints issued from the office of the Division of Ornithology during the year beginning December 1, 1920, and ending November 30, 1921:—

First Annual Report of the Division of Ornithology, December, 1920.

Department Bulletin No. 2, Food, Feeding and Drinking Appliances and Nesting Material to Attract Birds, fourth edition, January, 1921. A revision of the third edition of Department Circular No. 2, 36 pp., 10 half-tones, 21 line cuts.

Department Bulletin No. 6, The English Sparrow, fourth edition, March, 1921. A revised reprint of Department Circular No. 4, third edition. 20 pp., 1 half-tone, 9 line cuts.

Arbor and Bird Day, April, 1921. Prepared by Edward Howe Forbush and Harris A. Reynolds. Approved by Payson Smith, Commissioner of Education. 8 pp., 1 half-tone, 2 line cuts.

Department Bulletin No. 1, Outdoor Bird Study, third edition, April, 1921. A revision of the second edition of Department Circular No. 12. 51 pp., 4 half-tones, 26 line cuts.

Department Bulletin No. 9, The Utility of Birds, July, 1921. 83 pp., 9 half-tones, 16 line cuts.

Material in Preparation for Publication.

After-the-war economy has affected materially the list of publications from this office. An index of the twelve volumes of the annual reports of the State Ornithologist, which was prepared last year by Dr. John B. May has failed of publication, also a list of Massachusetts organizations interested in the study of bird life. These may be published at some future time, but no promises can be made. As there seems to be no probability that an annotated list of Massachusetts birds will be printed at present, work on this has been discontinued.

The principal work of the year regarding publications has been the beginning of two volumes on the birds of Massachusetts and other New England States, to be illustrated with colored plates, the preparation of which was authorized in 1921 by the Legislature, under chapter 5 of the Resolves of 1921. In addition to this authorization an appropriation of \$4,000 was included in the annual budget, to be used in the preparation of illustrative material for the first volume of the work. An agreement has been made with Mr. Louis Agassiz Fuertes, the well-known artist and ornithologist of Ithaca, New York, to prepare the drawings for the first volume, and he has completed and delivered some of them. Part of the text also has been prepared. Already many calls for the completed work have been received, but considerable time must elapse before the matter for the first volume is ready for the printer. In preparing this work it became necessary to settle conclusively some questions regarding which the evidence of ornithologists is contradictory. Correspondence with hundreds of ornithologists in the United States and Canada, and some in the Old World, elicited many personal experiences in respect to the use of wings under water by wild fowl, diving birds and other water birds, the alleged suicide of such birds when wounded, and the conveyance of the young to the ground or water by tree-nesting ducks. A voluminous preliminary report on the first two subjects has been prepared for the printer, and some observations on the manner in which the wood duck conveys its young to the water appear in the present report.

LIST OF MASSACHUSETTS SPEAKERS ON BIRDS.

The demand for lectures on birds before schools, granges, bird clubs and other organizations exceeds the supply. This office can no longer furnish many lectures during the year, as formerly. The following speakers gave service last year, and can be engaged for 1922. All, however, are otherwise employed and can give comparatively little time to the work.

Aaron C. Bagg, 70 Fairfield Avenue, Holyoke: Lantern slide talks.

Charles Crawford Gorst, 28 Beaufort Road, Jamaica Plain: Bird Music, Bird Habits and Bird Protection. Illustrated by colored charts and imitations of bird song.

Raymond J. Gregory, Princeton: New England Birds.

Mrs. Harriet Upham Goode, Box 455, Sharon: Local Birds and their Habits; Experiences in Making and Maintaining a Bird Sanctuary; The Wonderful Story of Migration. Illustrated by colored charts and lantern slides.

Mrs. Alice B. Harrington (member, State Grange Committee on Birds), South Lincoln: Bird Talks. Illustrated by colored lantern slides.

Mrs. E. O. Marshall (Secretary, State Grange Committee on Birds), New Salem: Many Phases of Bird Protection and Bird Life. Illustrated by large colored charts.

Dr. John B. May, Cohasset: Wild Life Near Home; Our Neighbors, the Birds; Hunted Birds and Birds that Hunt; The Utility of Birds. Illustrated by colored lantern slides.

Dr. Eleanor Mellen, 291 Lake Avenue, Newton Highlands: Economic Value of Birds; Attracting Birds about the Home; How to Study Birds; Birds in War-time.

Winthrop Packard (Secretary, Massachusetts Audubon Society), Canton: Bird Music and Bird Welfare. Illustrated by colored lantern slides.

Arthur J. Parker, 136 State House, Boston: Pleasure and Profit from Birds. Illustrated by colored lantern slides.

Walter K. Putney (Superintendent of Schools), Chelmsford: Bird Lore and Curious Old-time Beliefs; Birds and their Value to Mankind. Illustrated by colored lantern slides.

Professor Dallas Lore Sharp, Hingham: The Wild Life of Three Arch Rocks. Illustrated by colored lantern slides.

Horace Taylor, 3 Netherland Road, Brookline: Life and Song of Native Birds; Evolution of our Game Birds. Illustrated by lantern slides. Bird Friends in Colored Chalk (rapid drawing).

Rev. Manley B. Townsend, 188 County Street, Attleboro; The Special Adaptations of Birds; Following Nature's Trail; Friendly Visiting with Birds; How we answered the Call of the Wild. Illustrated by colored lantern slides.

Mrs. Henry F. Whitecomb, Amherst: Garden Planting and planting to attract Wild Birds; Birds' Migrations; Economic and Artistic Value of Birds. Illustrated by stuffed birds' skins and many colored plates and maps.

Rev. Arthur E. Wilson, 85 Newbury Street, Boston: Music of Birds; The Poets' Bird Land; Hiawatha's Chickens. Illustrated by colored lantern slides and whistling imitations of bird song.

COMPLAINTS REGARDING THE KILLING OF PROTECTED NON-GAME BIRDS.

Notwithstanding stringent State and Federal statutes prohibiting the killing of non-game insect-eating birds, this wanton slaughter seems to be increasing with the increase of licensed hunters. Never in my official experience have so many complaints been received regarding the killing of non-game birds as in the year 1921. Hunting by foreigners is illegal in Massachusetts, but complaints indicate that some of them continue to kill small birds. It has been suggested as a possibility that in the cities foreigners secure hunter's licenses illegally, or that they borrow licenses from those who have obtained them legitimately. The list of non-game birds killed by lawbreakers includes herons, gulls, terns, protected owls, nighthawks and nearly all song-birds large enough to make a mouthful for the pot. Some of these birds are shot down for mere sport and thrown away or left where they fall. Most of them, however, are treated as game and are killed to eat. All sorts of stratagems are used to deceive the onlooker and to conceal the game. Guns which can be easily concealed, guns almost noiseless, nets which when set are almost invisible, horsehair snares, traps, birdlime, — all these things are utilized. It is a common trick for the man with the game to conceal it in a bag of mushrooms and go home on a trolley car, while the man with the gun enters the city in another. This nefarious "sport" is not confined to Massachusetts, but is common all through New England and the Middle States. Many are arrested and fined, but still the destructive work goes on. The frontispiece of this report, from a photograph taken by Mr. Wilbur F. Smith, chief game warden of Fairfield County, Connecticut, exhibits the contents of the bag of one man who had shot the birds shown in the illustration. So long as these people come to

America, they will continue to kill song-birds. There are not wardens enough to protect the birds and there never will be. All we can hope to do is to educate the children of foreigners so that they will not follow in the footsteps of their fathers. People who feed birds complain that chickadees and other little birds that come to their feeding stations are killed or their legs broken by small boys with air guns. We must teach our own children to care for the birds, to feed them and to put up nesting boxes for them. No boy who has become interested in caring for birds will be guilty of using them for targets.

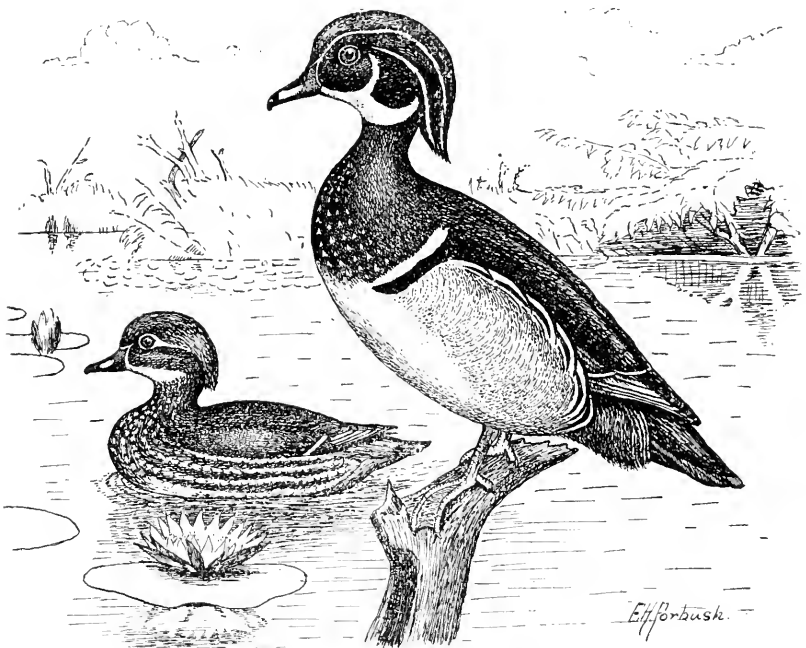
HOW THE WOOD DUCK GETS HER YOUNG TO THE WATER.

Ten years ago the Wood Duck, the most beautiful of American ducks, was in danger of extinction. Since that time under protective laws it has begun to increase in numbers, but as its chances in many regions are still somewhat precarious, any fact in regard to its life history will be of interest.

The Wood Duck nests often at a considerable distance from water, sometimes in swamps or dense woods; often close thickets lie between the nest and the water. As it nests in hollow trees and sometimes at a considerable height from the ground, the manner in which its young reaches the water has been a subject of dispute. Many years ago, when Wood Ducks were abundant, stories were told to the effect that the bird carried its young to the water. Such tales still persist in many parts of the United States and Canada, but, like the legend of the hoop snake, parental transportation of its young by the Wood Duck has come to be regarded by some naturalists as a myth.

During the past year investigation has been made to determine how the young Wood Ducks actually reach the water. The first record noted was that of Alexander Wilson, the "father of American ornithology," who says that he visited a tree containing a nest of the Wood Duck near the shore of the Tuckahoe River, New Jersey. It was in an old oak, the top of which had been torn off by a storm and which stood on the declivity of a bank about 20 yards from the water. The nest was in the hollow, broken trunk of the tree about 6 feet down

from the top. This tree had been occupied by Wood Ducks for four successive seasons. A person whose house was within 20 or 30 yards of the tree told Wilson that he had seen the female carry down 13 young, one by one, in less than ten minutes. "She caught them in her bill by the wing or the back of the neck and landed them safely at the foot of the tree, thence she afterward led them to the water." Wilson evidently believed this account.¹



Female.

Male.

WOOD DUCK (*Aix sponsa*).

(From Game Birds, Wild-Fowl and Shore Birds.)

The Wood Duck nests in a hollow tree. The female gets her young to the water in various ways, sometimes leading them and sometimes carrying them.

Audubon says:—

If the nest is placed immediately over the water, the young the moment they are hatched scramble to the mouth of the hole, launch into the air with their little feet and wings spread out and drop into their favorite element, but whenever their birthplace is at some distance from it, the mother carries them to it one by one in her bill. . . . On several occasions,

¹ Wilson, Alexander, and Bonaparte, Charles Lucien: American Ornithology, Vol. I, pp. 88, 89.

however, when the hole was 30 or 40 or more yards from the bayou or other piece of water, I observed that the mother suffered the young to fall on the grasses and dried leaves beneath the tree, and afterwards led them directly to the nearest edge of the next pool or creek.¹

Audubon says, also, that the claws of the young Wood Duck are very sharp indeed, and that he had known the ducklings to climb out of a cask.

Dr. Abbott, who reports that he watched Wood Ducks taking their young to the water from a hollow limb of the nesting tree, says that the mother bird seemed to give the little ones to understand that they were to follow her, and she clambered down the tree, which stood at an angle of 45 degrees as compared with the level surface of the ground. She was followed by the ducklings which then wormed their way to the nearest water. He asserts that the old women who tend poultry say that the ducklings will climb up any woodwork and seek out the nearest water. He was skeptical regarding their climbing abilities until he saw some climb up rough boards to a distance of 3 feet and lower themselves down on the other side. Dr. Abbott also notes that two years later he found another Wood Duck's nest on a steep bluff which was part of the bank of a creek. All over the slope was a dense growth of moderate-sized trees. He gives an account of the manner in which the young reached the water, which is in substance as follows: The nest hole was about 50 feet above the water in a smooth-barked and almost perpendicular tree. The young birds when hatched remained in the nest two days. Dr. Abbott climbed a tree that commanded a view of the nest. When he reached the tree on the third day some of them had disappeared. He waited and watched until he saw the mother bird come in and squat on the nest, when a duckling quickly climbed on her back and "nestled closely between her shoulders." The old bird then walked slowly to the edge of the overhanging limb, and with outspread slowly flapping wings let herself down to the water. The moment she touched the surface of the stream she dived, and left the duckling swimming on the water. This was repeated four times.²

¹ Audubon, J. J.: Ornithological Biography, Vol. III, 1835, p. 55.

² Abbott, Chas. C.: A Naturalist's Rambles about Home, 1885, pp. 239-241.

Sandys describes how he watched a Wood Duck taking young in her bill from the nest in a hollow willow tree, which stood about 20 yards from the stream and leaned away from the water. She carried the first duckling down the trunk in her bill and dropped it when about 2 yards from the ground. Others then came out of the hole and slid, scrambled and stumbled down the trunk. One was caught by one leg in a crevice of the bark, but was released by the mother. She then fluttered to the ground with it in her bill. She took another down in her bill, holding it by the skin of its back. In the meantime the last duckling ran halfway down the trunk, tripped and fell to the ground. She then led them to the water.¹

In Macouns' "Catalog of Canadian Birds" the following statement is made: "Have seen the old bird carry her young to the water in her bill," but this observation is credited to "Spreadborough."²

In the preface to the catalogue the Macouns say: "Practically all observations made by both of us since 1888 are credited to William Spreadborough, who since 1889 has accompanied either one or the other of us to the field nearly every year." Mr. Spreadborough was a collector who was fully trusted by the Macouns. He collected all their specimens, and in some years, notably in 1896, 1898, 1904, 1906 and 1907, he worked independently. His notes, revised by the Macouns, covered many parts of the Dominion of Canada from Labrador and Hudson Bay to Vancouver Island and north to Peace River, and he paid particular attention to the habits of wading and swimming birds.

Mr. E. G. Kingsford publishes an experience with the Wood Duck which occurred on the Michigamme River, Iron County, Michigan, early in July, 1898. According to his account the nest was in a hollow pine about 200 feet from the water, and 50 or 60 feet from the ground. The ducklings were all brought to the water by the female, and were held by the neck in her bill.³

In the years 1910-11 I investigated the decrease of waterfowl and shore birds in New England, and in a questionnaire

¹ Sandys, Edwin: *Outing*, Vol. XLI, No. II, November, 1902, pp. 164-168.

² Macoun, John and James M.: *Catalog of Canadian Birds*, 1909, p. 91.

³ *The Auk*, Vol. XXVI, No. 3, July, 1917, pp. 335, 336.

sent out widely at that time there was a question regarding the manner in which young Wood Ducks reached the water from the nest. Thirteen Massachusetts correspondents asserted that the Wood Duck carried the young. In one instance the mother bird was seen to push her young out of the nest, about 40 feet from the ground, and they fell to the grass apparently unharmed, then she led them to the water. In another case a Maine guide reported that he saw a Wood Duck fly down and alight on the water, and that the young, which seemed to be clinging to her back, fell into the water as she struck the surface. Some of my correspondents claimed to have seen the female bird carrying her young, others relied on the testimony of people in whose observations they had confidence.

Some special observers of the Division of Ornithology and a large number of Fellows, Members and Associates of the American Ornithologists Union in the United States and Canada were questioned this year in regard to their personal knowledge of this matter. Many of them replied that they had been told by credible witnesses that the female Wood Duck carried her young to the water either on her back or in her bill. Others asserted that the young climbed out or fell out of the nesting tree and were led to the water by the parent. Some had seen this. Others had seen the mother conveying her young.

Mr. H. F. Moulton of Ware, Massachusetts, says that he saw a Wood Duck carry her young from a hollow stub to the brink of White River. The nest was about 12 feet high and 10 or 15 feet from the water. The river flowed slowly at this point, and he observed the bird from a distance of about 75 yards. He cannot say just how it was done, for he was too far off. Mr. Chreswell J. Hunt of Chicago writes that on April 4, 1920, near Tillar, Arkansas, he discovered a female Wood Duck with her brood of 13 young crossing the railroad track evidently headed for a bayou that lay about half a mile away. These young ducks were caught and kept in a straight-sided wooden box, but it was ineffectual as a container, for the young birds climbed out "about as fast as they could be put back." They used both bill and claws in climbing. Apparently they would have had no trouble in climbing out of a hollow nesting tree.

Mr. E. F. Pope, El Reno, Oklahoma, says: —

Once, while fishing on the Neeches River in southeastern Texas, I observed a female Wood Duck bringing part of her brood of 10 ducklings down from a white oak stub 28 feet above the water. There were three or four of the young already in the water when I appeared on the scene. She emerged from the cavity in the stub with a young duck on her back, and simply dropped straight down into the water, using her wings enough to check the speed of her descent. When she arrived within a foot or two of the surface she suddenly assumed a vertical position which caused the duckling to slide from her back into the water. She rose quickly, circled a time or two, re-entered the stub, and at once repeated the performance until the whole brood of ten were on the water.

Mr. W. S. Cochrane, State Game Warden of Arkansas, wrote me, November 29, 1921, as follows: —

About the middle of April last I was in the vicinity of the Federal Reservation in Mississippi County, Arkansas, and noticed several Wood Ducks flying around the reservation lake. I spent two days to ascertain beyond a question how these ducks bring their young from the tree top to the water. One of these ducks had a nest in the top of an oak tree about 40 feet from the water.

Mr. Cochrane spent three hours watching the nest, and concluded from what he saw that if he stayed long enough he might see the female bring her young to the water, which she finally did. He describes the operation as follows: —

She visited the nest several times, and after circling around the woods returned and rested on the edge of the nest which was in a hollow stub of the oak. After resting there about ten minutes she flew down toward the water with her wings slightly elevated, and when about 10 feet from the water she began flying in an upward position, allowing one of the young which she was carrying on her back to slide off over her tail into the water. She went through this performance fourteen times.

He tried to learn what became of the young after they fell into the water, but could not locate them until after the bird had succeeded in getting them all down from the nest, when both male and female alighted in the water near where she had deposited her young. After swimming about in the wild rice, they swam into the clear water, when he counted 14 young ones with them.

Dr. George H. Jennings of Jewett City, Connecticut, says, regarding the Wood Duck: —

One day, more than twenty years ago, while standing close by a small pond, there was a splash of water about 15 feet from the shore, and I saw a young duck on the pond. I guessed what had happened and looked in time to see the mother bring another young duck. She held it in her bill and dropped it when about 5 feet above the surface of the pond. One more was added to the number. I think she saw me, and no more were brought. After waiting a short time I drove on.

Mr. Edward J. Court, Washington, District of Columbia, says: —

Twice I have seen young carried out of the nest by the female, in both cases in the bill. The male Wood Duck was in the water and stood guard over the young ducks as they were carried down. Fishermen in this section have told me that they sometimes carry the young down on the back.

Dr. Robert W. Shufeldt of Washington, District of Columbia, writes that at Ithaca, New York, a pair of Wood Ducks nested in 1872 in a tall sycamore tree, and that the female carried the young down to the water in her bill. In reply to my questions Dr. Shufeldt writes that the nest was some 40 feet from the ground in a hollow limb about 18 inches in diameter, 8 feet long and nearly horizontal, but slanting slightly downward. The tree stood approximately 100 feet from the margin of the lake, in a wood of fullgrown trees several acres in extent. Between the tree and the lake the ground was level, and only a little grass grew there. He could not see just how the bird seized the young, or whether they were all taken or carried in the same way. He believes that both the parents took part, and that each young was held in the bill of the parent and carried by a wing. He has a recollection that the little ones while being carried craned their necks and kicked with their little legs.

Dr. Walton I. Mitchell of Paonia, Colorado, says that he has seen this twice in Minnesota. The young birds were carried by the wing in the mother's bill. The nest was about 15 feet from the ground, and directly overhanging the water. Dr. A. A. Allen says that Mr. Foster Parker of Cayuga, New York, in

whose observations he has confidence, has seen a female Wood Duck fly to the pond with nothing in her bill, and when she struck the water a young bird appeared at her side. Mr. Parker believed that the young bird rode on her back. This belief is further supported, Dr. Allen says, by the actions of young Wood Ducks when reared by domestic fowls as foster mothers. For the first few days they spend much time riding on the hen's back, and their sharp curved claws enable them to hold on when she walks about. Mr. Parker writes me that he cannot be sure that the young one was on the Wood Duck's back, but he is sure that she carried it somewhere on her. There were five young in the pond, and when she alighted she brought one more which went from her to the other five. She came from a swamp nearly a mile away, and she did not have the duckling in her bill. Mr. Isaac Etheridge of Virginia Beach, Virginia, says that in summer he has traveled many miles in swamps trapping turtles, and during his lifetime has seen many young Wood Ducks carried to the water by the mother birds, but the species is so swift in flight that he could not be positive just how the young birds were carried. Apparently they were carried by the middle. He also asserts that during a severe thunder storm his brother saw a duck flying over the yard with something in her bill. There was a sharp flash of lightning, and the bird dropped what she was carrying. He ran out and picked up a little one still alive. Mr. Chase Littljohn of the California Academy of Sciences gives a somewhat similar instance.

Mr. Horace W. Tinkham of the Federal Farm Land Bank at Springfield, Massachusetts, writes me that he was lying one day nearly asleep on the bank of Fall Brook in Middleborough when he was astonished to see a Wood Duck with a young one in the brook. At a second glance he saw a second young one beside her. He kept watch without moving, and the occurrence was repeated several times; but owing to his position, which was not good for observation, and to the shadows about the wooded brook, he could not quite distinguish how the young were brought or whether she held them with her bill, but from the fact that the young one was always just in front of her, his impression was that she did so hold them.

Mr. T. A. James, curator of the State Museum at Augusta, Maine, writes me that while at Troutdale, Maine, Mr. Murray, the superintendent at the hatchery, informed him that a pair of Wood Ducks had bred in a stub of a tree there, and that he had seen them carrying their young in the bill one at a time from the tree to the lake. After depositing one duckling in the water, the bird immediately returned to the stub for another, and continued so to remove them until the entire brood was transferred. A letter to Mr. Murray elicited an immediate reply in which he says that the hatchery stands beside the woods about 1,000 feet from the edge of Lake Moxie, and that a pair of Wood Ducks had been coming there for several years to nest about 300 feet from the hatchery in a stub about 15 feet from the ground. About the last of June the mother takes the young in her bill to the water. There is a large tree about halfway to the pond in which she rests before completing her journey.

Lack of space precludes further detailed reports, but Mr. Lewis W. Hodgkins, Taunton, Massachusetts, Professor Robert Thompson, Plain View, Nebraska, and Mr. Clifford Cabell, Wingina, Virginia, give circumstantial accounts of the conveyance of the young of Wood Ducks to the water by the parent. Others give less definite reports.

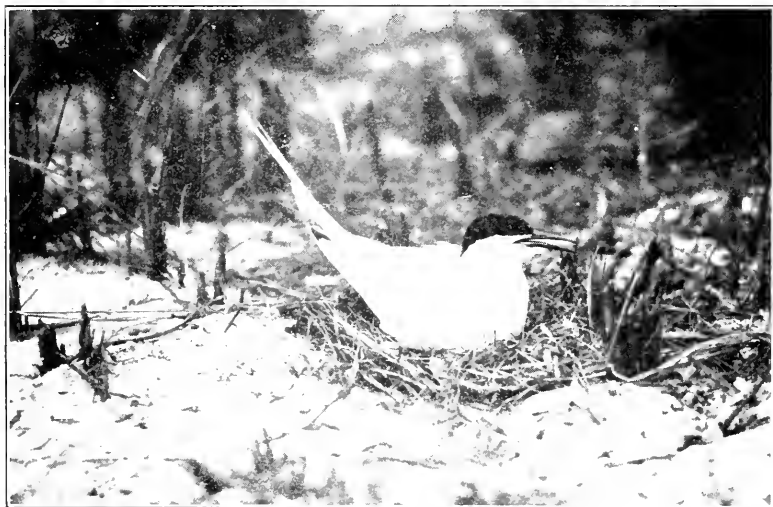
Some ornithologists show remarkable skepticism regarding the observations of others, believing only what they see. One who has seen the ducklings fall 40 or 50 feet from the nest insists that it would be impossible for the mother to carry them, and that she always leads them to the water. Another, having seen the mother carry them on her back, asserts that this is the only possible method, as it would kill them to be carried in the bill or between the feet or to fall from a high tree. One who has seen the mother carry the young in the bill disbelieves all reports to the contrary, and brings forward arguments to prove the impossibility of any other method.

Opinions or beliefs have no place here. The evidence only should be weighed and considered. We have evidence (not all of which has been given here, for lack of space) that tree-nesting ducks get their young to the water by the following methods: (1) By calling the young out of the nest, pushing

them out, or allowing them to climb out. Then they fall to the ground, and are led to the water. (2) By carrying in the bill down the trunk (if it inclines) to the ground, and leading them to the water. (3) By accompanying the ducklings in their march to water after they have scrambled and tumbled down the tree trunk. (4) By carrying them from the nest to the water on the back. (5) By carrying them from the nest to water in the bill. (6) Sometimes the young may be carried to the water either grasped in the feet of the parent or between the feet and tarsi and the body, somewhat after the manner of a woodcock transporting its young.

So far, however, the evidence on the last method is not so convincing as that regarding the others. Apparently, all rules that ornithologists have laid down in respect to the conditions under which the different methods are used are disregarded by the birds. Height from the ground seems immaterial. The young birds fall, scramble down, or are carried down, as the case may be. Sometimes if they fall 40 or 50 feet they are stunned for the moment, but soon recover. Distance to the water (within limits) does not affect the case. If the nest is directly over the water the parent may, nevertheless, carry her ducklings down, she may allow them to fall, or she may carry them part way down and then drop them. This happens over either ground or water. Whether the nest is in a hollow horizontal broken limb from which the young could readily tumble, or in an upright stub from which they must climb with difficulty, the young may climb out or be carried out in either case, according as their own enterprise or the caprice of the parent may determine. There seems to be individuality even among ducks.

In one case, where the nest was said to be over 2 miles from the lake, it is a matter of conjecture whether the tiny ducklings would have been able to travel the entire distance on their own feet, feeding on insects or vegetation by the way. In this case, however, the mother was seen to carry them. Our correspondence shows that in the majority of cases reported the young were conveyed to the water by the female, but I am inclined to question whether that is the usual proceeding, as many other instances have been recorded in which the duck-



Roseate Tern brooding young. (Original photograph.)



Roseate Terns feeding young. (Original photograph.)

lings scrambled down, fluttered down, or fell out of the tree and were either led or conveyed to the water. Considering all the evidence, it seems that we can no longer doubt that in many cases the young of the Wood Duck are carried from the nest by the female parent, and that they are sometimes thus conveyed for distances of half a mile or more.

AN INVESTIGATION OF THE PRESENT STATUS OF THE GULLS AND TERNS OF MASSACHUSETTS.

It is well known that for some years past the gulls and the terns of Massachusetts have been increasing. More and more Herring Gulls have remained in summer in the State, and more and more Laughing Gulls have appeared in summer on our coasts at points where in the past they have been absent. This increase of the gulls is due mainly to two causes: (1) The Herring Gulls have been protected for years in the great island nurseries of sea birds on the Maine coast. This protection by wardens of the National Association of Audubon Societies has resulted in such a multiplication of the birds that the species gradually has disseminated southward. (2) The Laughing Gulls which breed on Muskeget Island have been protected for many years by an officer employed by the town of Nantucket, and during these years they have increased from about a dozen pairs to many thousands.

The terns of Massachusetts are protected by strict laws. In recent years several of the most important colonies have been guarded during the breeding season by wardens employed by the Massachusetts Commission on Fisheries and Game, and last year by deputies of the Massachusetts Conservation Commission. This protection, together with a public sentiment in favor of the birds, has given the various species an opportunity to breed with comparatively little molestation; therefore until 1921 they have increased. Herring Gulls began breeding in Massachusetts in 1912, when Mr. Allan Keniston found the first nest on Marthas Vineyard at Swan Neck in the Edgartown herring pond. A year or two later several pairs nested on the east side of the pond, and after that the birds went to Skiff's Island where there was a large colony of the Common

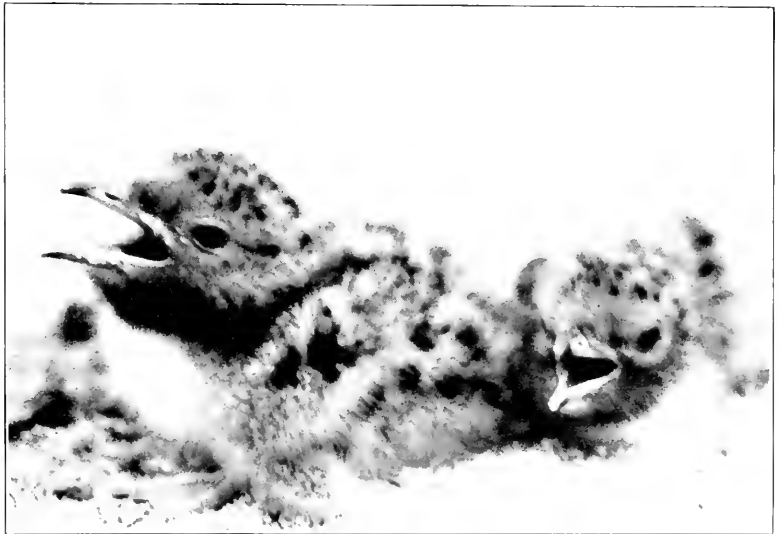
Tern which has become greatly reduced since occupation of the island by the gulls. For two or three years several pairs of Herring Gulls have been breeding on the outer bars of Muskeget, where they were first found by Mr. Winthrop S. Brooks of Boston.

The prosperity and increase of the Massachusetts tern colonies appear to be nearing the end. This may be due in part to the increase of the gulls. Mr. A. Burdett of Overveen, Holland, a well-known ornithologist, tells me that the protection of Herring Gulls in England and Holland, which has increased their numbers exceedingly, has resulted in a great reduction of some tern colonies. The gulls destroy the eggs and young of the terns, and on one island, with the history of which he is fully acquainted, the terns have been extirpated. I am informed by Dr. John C. Phillips, who was on Muskeget during the breeding season this year, that the colony of terns there has decreased. Laughing Gulls are known in some cases to destroy the eggs and young of terns, but there is no evidence that they have done that on Muskeget. The smaller birds, however, may be giving way to the larger.

During the past breeding season I have visited all the large colonies of terns in Massachusetts except those at Penikese and Muskeget, and many of the smaller colonies, sometimes in company with Mr. A. C. Bent, at other times with Mr. Charles Weekes or Mr. T. Gilbert Pearson or alone. Many small colonies have been extirpated. Among the larger colonies only one was found to be as prosperous as in former years. That was the Nauset Colony, where the birds were protected by Mr. Daniel Gould, employed by the Massachusetts Conservation Commission. All the other colonies, apparently, are decreasing in numbers, with the possible exception of the Chatham colony on south beach which has received accessions from birds that formerly nested on north beach. Arctic Terns attempted to nest on north beach this year, but were driven off in part by high tides and in part by cats, skunks and perhaps other natural enemies which overrun the beach. In the large Chatham colony and at Muskeget there was great mortality among the young birds. At the Wepecket Islands the terns began to breed early, but during the summer they largely disappeared. Some went



Young Roseate Tern from a Massachusetts colony. (Original photograph.)



Young Herring Gulls from a Massachusetts colony. (Original photograph.)

to Little Pine Island, others may have gone elsewhere, but probably not over 100 broods were reared this year on the Wepecket Islands. The Least Terns, which had been decreasing in numbers for several years on the south shore of Marthas Vineyard, almost disappeared this year, but some of them nested elsewhere, as they were found in two localities farther north. At Chatham there is an increase of Roseate Terns, some of which may have come from the Wepeckets, but there are many small colonies of terns on the mainland which, like the Least Terns on the south shore of Marthas Vineyard, cannot maintain themselves in any one locality because of cats and other natural enemies, including man. The difficulty in protecting these birds on the Massachusetts coast is this: most of the islands on which they breed are close to shore or in bays and harbors where they are likely to be overrun by summer visitors with their dogs, by eggers or by fishermen. Several colonies were raided this year by eggers or by egg-eating natural enemies, and if the birds succeeded in raising any young, it was not until very late in the season. It is known that foreign fishermen steal the well-grown young of terns and gulls for food and for bait. They also take the eggs. At least two of these men have been taken in the act by an officer of the law.

The Least Tern breeds on the open outer beaches. It is said that they formerly bred on Nantucket, and that a colony or two has existed there for several years. In 1921 I was unable to find a Least Tern on the island, but have been told that a small colony appeared this year directly in front of a summer hotel. If so, what happened to them may be imagined. Their best chance was on the island of Marthas Vineyard, where there are comparatively few of their natural enemies. Having largely left that island now they will be unable to maintain themselves elsewhere unless wardens can be appointed to guard the colonies closely during the breeding season. The locations on the mainland which they have chosen are likely to be overrun by cats, dogs and various other natural enemies, and the extinction of the Least Terns in Massachusetts will surely follow unless a greater measure of protection can be afforded them. Such an outcome would be unfortunate, as during the "feather craze" of the latter part of the nineteenth

century, when feathers of terns became extremely fashionable, the Least Tern was nearly exterminated from eastern North America, and we now have in Massachusetts the remnant of this species saved from the slaughter in the northeastern United States.

It is important to protect the elegant Roseate Tern here, as Massachusetts is near the northern limit of its breeding range, while this State is the southern limit of the breeding range of the Arctic Tern. All these birds within the borders of this Commonwealth should be preserved. They are elegant, graceful and beautiful, giving an added attraction to our seaside, and they are useful to the fishermen, as their constant activities point out the schools of edible fish. Shore fishermen recognize this fact.

The protection of Herring Gulls was imperative at the time when it was inaugurated on the Maine coast, and also when the law protecting them was passed in Massachusetts, for they had been threatened with extinction for millinery purposes; but now their increase as breeding and summering birds on our coast will probably prove an added menace to the terns. Possibly they cannot maintain themselves here long, as their nesting places will undoubtedly be raided by fishermen and eggers as soon as the localities become well known.

It seems probable that the increase of our people, particularly the summer population, will result in increasing disturbance of the birds, and that the terns nesting along our coasts will eventually be driven from the mainland and all near-by islands. But there are two offshore islands that these birds now occupy and on which they can be perpetuated if given adequate protection. One is Muskeget in Nantucket County, the other is Penikese in Dukes County. Penikese Island is well away from the coast; it is the property of the Commonwealth and has been used as a place for segregating lepers. The leper colony has now been removed. A large number of Roseate Terns and Common Terns nest there. There are some small ponds on the island. It would make an ideal reservation not only for terns but for wild fowl and shore birds also. This, the only large island now owned by the Commonwealth, should be mainly devoted to the preservation of these birds. Penikese

is historic ground, as the place on which the first summer school of natural history in Massachusetts was established in 1873 by Louis Agassiz. In this school several of the most famous naturalists of the United States received from the master early training in zoölogy. This island should be held in perpetuity as a bird reservation by the Commonwealth of Massachusetts.

BIRD BANDING.

There is no field of endeavor which now offers greater possibilities for the discovery of facts in ornithology than that of banding birds. In two issues of the notes sent out semi-monthly to the hundreds of observers who report to this Division, attention was called to the importance of the work of bird banding. On July 16 Mr. S. Prentiss Baldwin of Cleveland, Ohio, sent me a letter saying that he would be in Massachusetts in August, and that he hoped to meet any Massachusetts people who were interested in such work. Mr. Baldwin is the originator of the plan of trapping birds for banding purposes. His work in Ohio and Georgia has resulted in the discovery of so much new information about birds that the Bureau of Biological Survey of the Department of Agriculture at Washington has taken up bird banding, and will furnish bands and trapping permits to suitable persons who make application for them.

Mr. Laurence B. Fletcher of Brookline, Massachusetts, one of our divisional observers, has taken an active interest in organizing a bird-banding campaign. He arranged in August for a meeting in the lecture room of the Boston Society of Natural History, which was addressed by Mr. Baldwin. Much interest was shown by those present. Mr. Fletcher has undertaken, with characteristic energy and enthusiasm, and at his own expense, to organize a New England Bird Banding Association. A large number of our observers and others have applied for membership, and Mr. Fletcher has already secured from the Biological Survey and the Massachusetts Department of Conservation trapping permits for numerous applicants.

The work of banding can be done without injury to the birds, and if many people distributed over a wide region can

be induced to engage in it, the possibility of surprising results will be greatly increased. The following notes show the value of the method. A Loon marked in New England was taken ten years later in Florida. That a Loon should follow the coast to Florida is not unexpected, but the date when the bird was taken indicates a longer life in this species than the experience with it in Zoölogical Gardens would lead us to expect. A Robin banded in New England was taken later in Kentucky. Young Night Herons banded in summer on Cape Cod have been taken soon afterwards on the Maine coast.

Dr. John C. Phillips of Wenham, Massachusetts, banded on July 3, 1913, a Common Tern at Eastern Egg Rock, Maine, which was found in August, 1917, floating, dead, on a branch of the Niger River Delta in West Africa. Mr. Jack Miner, Kingston, Ontario, has banded many ducks, and now believes from his experience that male ducks which mate before they go north follow their mates to the homes of the latter, breed there, and return to Kingston in autumn with their families. Some of his birds have been taken at points many hundreds of miles away, in various directions, from Kingston.

Mr. Baldwin's experience in banding House Wrens will shake the belief, cherished by many people, that song-birds mate for life. He has found that birds of a pair sometimes separate before the breeding season is over, and mate again with other mates between the first and second broods. Mr. Baldwin's experiences would lead one to believe that it is quite possible that a male House Wren might mate with his sister for his first brood of the year, and with his grandmother for the second. There is much to be learned by bird banding about the mating habits, route and rate of migration, ages that wild birds reach under natural conditions, winter ranges of individuals, propensity to wander after the breeding season, etc. There are many lines of investigation that will suggest themselves as the work goes on. Bird banding should be fostered and encouraged by every one interested in the acquisition of new facts in ornithology.

THE HEATH HEN.

Two special trips were made in April in an attempt to take a census of the nearly extinct Heath Hen which is found nowhere else in the world except on Marthas Vineyard. It was impossible to take a census in 1920. In 1919 the census indicated at least 165 birds. In April, 1921, we were able to place 314 birds. The impression obtained from the two trips taken was that the number of birds living was considerably larger, possibly in excess of 400. Later, however, the season appeared to be somewhat unfavorable. There were severe and late frosts during the time when the birds were laying their eggs, and Mr. Allan Keniston, superintendent of the reservation, believes that these frosts destroyed many of the eggs. The number of young birds seen in summer was not so great as might have been expected otherwise. But in other respects the breeding season was favorable, and the census of 1922 should show an increase, unless something unforeseen happens in the meantime.

EXHIBITIONS.

An exhibition of game birds, wild fowl and shore birds was made at the State Building during the Eastern States Exposition at Springfield, September 18 to 24, 1921. This exhibit attracted a great deal of attention and favorable notice. There was an attendance of 246,000 at the exposition. An exhibition of bird enemies of the gypsy moth was made at the Brockton Fair, October 4 to 6, 1921, in connection with an excellent exhibit of the Brockton Audubon Society. The attendance was about 250,000. At both these exhibitions literature regarding the protection of birds was distributed.

BIRD MIGRATION AND DISTRIBUTION DURING THE YEAR.¹*December, 1920.*

Our fiscal year begins on December 1. It will be remembered that December, 1919, was very inclement. Winter came early. But December, 1920, tells a different story.

A Mild Month.—On the 15th the weather seemed like spring, the grass was green and flowers were blooming in some

¹ A brief summary compiled from reports of divisional observers, and office records.

gardens. A few flowers were in bloom until the 26th. The month was mainly mild, with much rain during the first half and only one real snowstorm, which began on the night of the 26th, and left about 5 inches of snow on the ground. This storm was preceded by the coldest day of the month. In places the thermometer registered several degrees below the zero mark. Some of the small ponds of Massachusetts were iced over during a brief period of cold early in the month, but after that most of the ponds and lakes were open until the 26th.

A Great Dearth of Land Birds. — Notwithstanding the mildness of the season, most correspondents reported a greater dearth of land birds than was observed even in November, 1920. Many said that they had never seen so little bird life at that season of the year. The scarcity of waterfowl was not so great as that of land birds, but water birds decreased after the 20th along the Massachusetts coast, and apparently increased for a time on the shores of Rhode Island and Connecticut.

No Flight of Boreal Birds. — There was almost no evidence of a southward movement of boreal winter birds. Apparently the large supply of food in the north held them there, although a similar supply in much of the New England region did not retain many of the winter residents here. This state of affairs lent color to the theory that many individuals of our so-called winter residents are migratory, and that most of the individuals of such species as usually are found here in winter really come from farther north. The winter movement toward the seacoast and river valleys was apparent as usual, but it was least noticeable among Crows, Blue Jays, Starlings, nuthatches and woodpeckers, excepting the Flicker.

Dovekies netted by the Bushel. — Very few Arctic water birds appeared on the coast, except Dovekies, which were numerous offshore. It was asserted that two bushels of these birds were taken at one time in gill nets off the Massachusetts coast. There were several reports of an Arkansas Kingbird in Essex County; Red-winged Blackbirds were reported during the month on Cape Cod, Block Island, Rhode Island, the southern coast of Connecticut, and in New Jersey. No flocks of Cow-

birds were reported from Cape Cod, but some were noted in Rhode Island. There were very few reports of Pine Grosbeaks, Evening Grosbeaks, Siskins, Purple Finches, Crossbills or Redpolls in southern New England, and Goldfinches were generally scarce. Many kinglets had moved south during November, but Golden-crowned Kinglets were less rare in December than most other land birds, and several Ruby-crowned Kinglets were reported during the month in Massachusetts and on Long Island, New York. A few Field Sparrows and Savannah Sparrows still remained in southern New England. A flock of Tree Swallows was reported December 30 on Long Island.

January, 1921.

Still Mild. — January also, in strong contrast to January, 1920, was unusually mild. There were stories of woodchucks, caterpillars and earthworms moving about, English Sparrows nest-building, wild flowers, spicebushes and willows in bloom, with roses and other flowers blooming on Nantucket, wild ducks and geese flying northward, and a Pheasant at Nantucket sitting on a nest full of eggs.

Ducks and Geese move Northward. — Reports of ducks and geese flying northward probably arose from birds going from the sea to inland ponds, but in the Mississippi valley thousands of wild ducks worked northward during the month. The cold wave of the last of December continued for a day or two into January and brought with it a flight of birds from the north. Again followed a rising temperature, and the ice cleared from many ponds, but there were some sharp touches of frost during the month.

Notwithstanding the generally mild weather of the winter, some of the smaller birds which were common along the Massachusetts coast during the larger part of the winter of 1919-20 were much rarer in the winter of 1920-21. Perhaps this may be accounted for in part by the fact that many individuals which were accustomed to winter here had been killed off by the severity of the former season. Waterbirds, however, were unusually abundant for this season of the year, not only along the coast, but in the interior wherever wide waters and sufficient

food attracted them. A few Bonaparte's Gulls and Ring-billed Gulls remained along our coast.

Geese flying South. — Canada Geese were seen flying south during the first few days of the month, following a cold wave. A few Great Blue Herons wintered in Massachusetts, and some were recorded along the coast almost to the northern boundary of the State. Sanderlings were seen on Cape Cod early in the month. There was no great flight of hawks and owls from the North, such as was reported in the winter of 1919-20. Evening Grosbeaks and Pine Grosbeaks were rare.

Arkansas Kingbirds. — Arkansas Kingbirds were heard from again this month, on Long Island, New York, and in Maine. A few Rusty Blackbirds were noted in several widely separated localities in Massachusetts, and many Red-wings in Massachusetts and Rhode Island. Few Cowbirds were reported. A flock of Tree Swallows was recorded on the 1st and 9th, and a single one on the 13th on Long Island, New York.

Catbirds Wintering. — There were six records of Catbirds in Massachusetts and two on Long Island, and about the usual number of Mockingbirds were recorded during the winter. A few Hermit Thrushes wintered and a single Ruby-crowned Kinglet was reported on the 1st in Massachusetts.

February, 1921.

February also was mild in southern New England, with little snow until the night of the 20th, when a snowstorm began which within twenty-four hours left 16 to 20 inches of snow on the ground. At Boston this was the greatest snowfall on record for a single day. Before the snow came there were many signs of spring.

Spring Migration begins. — By the 15th the spring migration had begun. Spring birds were coming up all along the coast to New Jersey. Bluebirds increased in numbers in Massachusetts. An early northward movement of Cedar Waxwings along the coastal plain of Massachusetts was quite pronounced; a few Bronzed Grackles, Rusty Blackbirds, Cowbirds, Red-winged Blackbirds, Fox Sparrows, Field Sparrows and Swamp Sparrows were reported from various localities in Massachusetts and a single Chipping Sparrow was noted; willow catkins had

assumed their spring aspect; ants, spiders and frogs became active on some of the warm days; a few woodchucks and chipmunks had left their winter retreats, skunks were out, and a small snake was reported on Cape Cod. During this time Bluebirds straggled over southern New England to middle New Hampshire and Maine. Song Sparrows increased in number; Tree Sparrows and Juncos began to move northward. Prairie Horned Larks began their flight songs at unprecedentedly early dates. Waterfowl were seen working eastward in their spring migration. Robins, Bluebirds, Song Sparrows, Meadow Larks and Purple Finches were reported in full song.

Tree Swallows Wintering on Long Island. — A few Tree Swallows still remained on Long Island, New York, up to the 20th. A few Orange-crowned Warblers, a Pine Warbler and a Yellow Palm Warbler were reported in southeastern Massachusetts. The storm which began on the 20th was followed by zero temperatures, and winter settled down upon the earth. The storm and its following chill extended as far south at least as Georgia, and held up migration all along the coast. It was followed about a week later by northeast rainstorms, which swept the earth clear of snow. On the 19th Canada Geese had reached Kingsville, Ontario, and by the 23d Brants began to migrate eastward along the Atlantic coast of Long Island.

March, 1921.

This month brought a variety of weather and a wide range of thermometer readings, from winter cold to summer heat. There were cold snowstorms and warm rains with thunder and lightning, but there were only two short periods of cold, and the thermometer never neared the zero mark. It seems to have been about the mildest March on record. Temperatures from 82 to 90 degrees were reported from various parts of the Middle States, also sudden drops of 30 to 40 degrees in as many minutes. About the 12th many insects were reported in flight; hylas, wood frogs and toads began to make music locally and by the 20th were quite vocal in the three southern New England States. Chipmunks, woodchucks, turtles and water snakes appeared, and many varieties of plants were reported in bloom.

Ice goes out Early. — The ice went out of New England rivers

much earlier than usual, and the St. Lawrence was clear and open for navigation on the 27th, the earliest recorded date. Many lakes in New England and the maritime Provinces were clear of ice before the last of the month. Early spring birds began to come into southern New England as the month began. On the 3d there was a great movement of Robins in western New York; on the 6th a considerable migration of Robins and other spring birds in the coastal regions of southern New England; while all the next week, until the 12th and 13th, Red-winged Blackbirds, Robins, Bronzed Grackles, Bluebirds and Song Sparrows were reported over the greater part of New England and in some southern Canadian Provinces.

The great flood of early migration was about three weeks in advance of that of 1920. Many stragglers of species that usually arrive in April or May were recorded. A few Pied-billed Grebes had been reported during the winter, but only two were heard from during March. A migratory Woodcock was noted March 1st in Massachusetts. Migrating hawks began to appear in Maine and the Provinces late in the month. Blue Jays which had been considerably reduced in numbers during the winter appeared to be increasing again in southern New England, and before the month ended Crows were on their breeding grounds.

A Few Catbirds and Hermit Thrushes Wintered. — Some Catbirds successfully passed the winter in Massachusetts. Tree Swallows arrived in hundreds at Plymouth, Massachusetts, March 20. There was an early movement of Ruby-crowned Kinglets in southern New England, and one individual was reported from Maine. Small numbers of Hermit thrushes appeared in three counties of Massachusetts, but these may have been wintering birds, as a few were reported all winter. A heavy flight of Wilson's Snipes passed northward.

April, 1921.

The mild weather of March was followed by warm April days. Columbines were in flower on the 27th, and generally in Massachusetts vegetation was about three or four weeks earlier than in 1920.

Warm Weather and Early Migrants. — During the first week

of April there was a small flight of Yellow Palm Warblers and Pine Warblers, with a few Myrtle Warblers. Both species of kinglets, Winter Wrens and House Wrens came in good numbers. A large migration of Goldfinches occurred from the 12th to the 18th. There were many early records of warblers, thrushes, Catbirds and a few of Indigo Buntings and Baltimore Orioles. Twenty Bohemian Waxwings were reported in northern Vermont on the 17th. During the month many albino Robins were recorded from widely scattered localities. A Blue-gray Gnatcatcher was seen in Massachusetts and another in Ontario, Canada. Two Kingbirds were reported in Massachusetts during the last days of the month. Birds, however, with the exception of stragglers, were not much earlier than usual on May 1. The early flight which came on the warm days of March was followed by cold weather in the South, with frost and snow in some localities in the Middle States, and some April weather in northern New England was like that of an ordinary March.

May, 1921.

Ice and snow still remained on May 1 in the Maine woods, and a scarcity of migratory birds was noted throughout the greater part of New England. In Massachusetts the foliage had advanced to the stage when the May warbler flights usually appear, but most of the May birds had not arrived.

Cold delays Migration. — The promise of an early May migration which had been held out by March and April was not realized. Following the premature advent of spring in March and the succeeding warm weather of early April there were twenty-seven days of cool or cold weather, with wind varying mostly from north to east. Vast quantities of ice were drifting down into the north Atlantic, and this influence was felt in the east wind. Storms, mists and local frosts prevailed from time to time over most of the New England region. The period was broken only now and then by one or two days of warm southerly or southwesterly winds. Vegetation, which had advanced far beyond its usual April development, was checked, and although many of the earlier flowers had bloomed much

before their usual time, some of the later ones were even later than normal. This was true, also, of the migrating birds.

Day after day brought few or no new arrivals, and it seemed as if the spring migration was over.

Migration goes on. — On the night of the 13th there was a great flight of birds from the South in New York City, and several new arrivals appeared in Massachusetts on the 14th. On the 15th a flood of migration came through Massachusetts and passed into northern New England and New Hampshire. This flight came with a change in the wind, which shifted from easterly to southwesterly with rising temperatures. During these two or three days practically all the species of summer birds arrived, but mostly in small numbers. After this the birds continued to come slowly until, on the 21st and 22d, with south winds and very high temperatures, there came what seemed to be the greatest flight of the season. Even then there was not noted any very great migration of northern warblers. Shore birds appeared in immense numbers, and a large flight of Loons passed Cape Cod. Among the rare birds reported were a male Blue Grosbeak and a male Black-headed Grosbeak in Middlesex County, Massachusetts.

June, 1921.

This was a dry month in southern New England, with the exception of some heavy rains during the last week.

Good Weather for Nestling Birds. — The weather was favorable for nestlings, and great numbers of young birds were reared successfully. The period was so dry that it was impossible for Robins and other birds which feed much on the ground to secure the usual numbers of earthworms and grubs. Therefore there were many complaints of depredations on cherry trees and cultivated strawberries. During the first two weeks of June there was some evidence of continued migration. Cuckoos were not noted in some localities until the first or second week of the month, and in some cases Indigo Buntings were not seen until about the middle of the month. On June 9 a band of 200 Surf Scoters and White-winged Scoters still remained off Long Island. Bonaparte's Gulls and shore birds were still there. On the 20th six migrating Nighthawks were

observed in Hampden County, Massachusetts; on the same date a Black-poll Warbler was noted in southern New Hampshire, and on the 23d a Wilson's Warbler in Vermont.

A Flight of Blue-gray Gnatcatchers. — In April and May there was a small flight of Blue-gray Gnatcatchers in New Jersey and New England, some reaching Canada. The last individual recorded was seen early in June near Boston. A male Western Tanager was reported on the 12th from western Massachusetts. The increase in House Wrens which has been conspicuous in recent years continued. The species was reported as common in many localities through the State, from the New York line to the sea.

July, 1921.

This month was unusually warm with prevailing southerly or southwesterly winds, also many heavy rains with local or general tempests and a few hail storms. Fortunately the hail storms were local, as very large hailstones fell and did serious damage not only to crops but to birds both young and old. A pair of Blue Grosbeaks was observed from July 1 to 30 in Maine. On the 10th one was seen in Worcester County, Massachusetts. In the early part of July, when the weather became hot, white herons began to appear in New England from the South. They moved mainly along the coastal plain. While these southern birds were moving northward, the migration of northern birds southward had already begun.

The Southward Migration begins. — During the first week in July, Dowitchers, Semipalmated Sandpipers, Hudsonian Curlews and Black-breasted Plovers appeared on the Massachusetts coast, and during the second week several species of sandpipers appeared, together with some Turnstones and Yellow-legs. Semipalmated and Western Sandpipers were reported July 2 on Long Island. Forty to fifty Yellow-legs were observed there on July 10, with two or three Stilt Sandpipers and a Wilson's Snipe. Before the first of July Red-winged Blackbirds and Starlings had begun to gather locally in small flocks, and soon afterward young Bronzed Grackles were seen flocking. Land birds began to wander from their breeding places.

Early Southward Movements of Land Birds. — On the second week in July, in Maine, small birds were heard passing over

at night. Bonaparte's Gulls were noted in numbers July 24 in Essex County, Massachusetts. Warblers were seen in northern New Hampshire flocking in preparation for migration on July 25. A few Red-breasted Mergansers, Old-squaws and Scoters were reported on Cape Cod. On the 20th a Red-breasted Nuthatch boarded a steamer in the Gulf of St. Lawrence, and a little later birds of this species began to appear in Maine in places where they had not been noted all summer. This marked the beginning of a large and early southward migration of the species.

An Early Flock of Canada Geese. — On the 18th a flock of 13 Canada Geese appeared in northern Middlesex County, Massachusetts. These birds were the forerunners of an early and immense migration of ducks and geese.

August, 1921.

There were warm days in August, but much of the latter half of the month was cool, with occasional light frosts in various localities. The cold weather of the month, together with an early movement of Canada Geese, induced the seers to prophesy a hard winter. The season in the North had been dry as a whole, and August ended with a great scarcity of fruit, cones and nuts in striking contrast to August, 1920. This was caused in part by the dryness of the season and partly, perhaps, by late spring frosts when blossoms were maturing. This scarcity of food, with early autumn frosts and cold north winds, apparently tended to start the birds southward earlier than usual. By the 15th unusual numbers of Blue-winged Teals began to appear in Massachusetts.

More Geese. — Canada geese to the number of 750 were reported during the month. Many northern warblers appeared in migration during the latter part of August in New England or on Long Island. Nighthawks, Kingbirds, Bobolinks and Tree Swallows began moving southward about the 15th. Birds were heard flying over at night all through the month. Barn Swallows were seen August 10 migrating westward along Long Island Sound and on the night of the 12th there was a considerable movement of land birds over the Sound. On the 14th, at Williamstown, Massachusetts, thousands of migrating

swallows were seen resting at noon. After a few minutes they took wing and disappeared. Chimney Swifts, Robins, Tanagers, Rose-breasted Grosbeaks, Catbirds and cuckoos were noted in migration. There were large flights of the smaller sandpipers. A male Blue Grosbeak was reported during the month in Middlesex County, Massachusetts, and another in Maine.

Evening Grosbeaks appear early. — Ninety-five Evening Grosbeaks also were reported (mostly from Massachusetts) and 30 Pine Grosbeaks from Rhode Island.

September, 1921.

The weather of September was fine and warm, but early migration continued. Two Holboell's Grebes were reported September 14 from New Hampshire. Loons were common locally during the latter part of the month on the Massachusetts coast. Large flocks of Black Ducks and Scoters and a few Green-winged Teals appeared.

Many Ducks and Geese. — Geese were reported here and there in small or large flocks. Thirty flocks were reported passing Marthas Vineyard early in the month, and during the week of the 15th thousands of ducks and geese were seen nightly flying southward in Ohio.

The month was notable, not so much for the large number of individual birds, as for the considerable number of species. On the 17th Blue Jays were reported as abundant in the northern Ontario woods; Jays were next seen passing southward in Vermont, and on the 18th, in Berkshire County, Massachusetts, a considerable migration of Blue Jays was observed, all going south. The great flight of warblers appeared to have passed during the first half of the month. Only one flock of Evening Grosbeaks was reported during the month, and that was in southeastern Maine. A Blue Grosbeak was reported September 23 from Essex County, Massachusetts. Chickadees increased in number.

The Flight of "White Herons." — From Southern New Jersey to Maine about 150 "white herons" were reported between the middle of July and the middle of September. From the reports received, it is probable that there were many duplications,

and that at least one-third of the birds reported were immature specimens of the Little Blue Heron which are white before reaching maturity. The rest apparently were Egrets, and of these only two were of the smaller species — the Snowy Heron. In Massachusetts “white herons” were reported mainly in small groups, ranging in numbers from 3 to 11. The shore towns mainly were represented in the reports, such as Edgartown, Wareham, Plymouth, Duxbury, Marshfield, Cohasset, Saugus, Lynn, Rowley, Ipswich and Newburyport. In Connecticut the birds were seen mostly along the shore of the Sound in such towns as Fairfield, Norwalk and Bridgeport, and this was true also of Rhode Island. In Maine several birds were reported from Ogunquit and Scarborough. There were a few reports from the interior; some of these from New York. Eleven birds were reported in Hanson, Massachusetts, 3 in Lincoln and 5 in Sudbury. Some of them had disappeared by the 15th of August when the shore-bird season began. Others remained until September. The largest number recorded at any one time was 20 birds in one flock flying westward in September, in Connecticut. This is the greatest movement of white herons from the South that has taken place in recent years.

October, 1921.

October as a whole was mild and fair, with a few storms and a few cold nights toward the end of the month. Flowers bloomed here and there nearly all the month as far north as New Brunswick. On the 6th in northern Vermont sheep laurel was in bloom for the second time, and some raspberries had fruited again, while in Boston a horse chestnut tree which had shed its leaves early from the lower branches put out new leaves and blossoms.

Notwithstanding the mildness of the season the birds went south rapidly, and before the middle of the month most of the northern warblers had passed and were in the southern Atlantic coast States or farther south, and the migration of sparrows had well begun.

A Large Flight of Night Herons. — On October 4 in Connecticut a very large flight of Night Herons was noted moving southward. The night of the 4th was cold, and on and

after that date floods of Myrtle Warblers and Black-polls passed southward. On that day Myrtle Warblers reached Long Island, New York, in numbers. These two species were still moving across Long Island Sound up to the 16th. On the 16th and 17th, in all the New England States and on Long Island there was a very widespread migration, which included most of the later sparrows. After this flight there were few birds left in some sections of northern New England. The flight was larger than that of September, but decreased much during the last week of the month, when warblers, sparrows, thrushes, Robins, Bluebirds and Flickers, which had passed in great numbers, were no longer generally abundant. Their places were taken in part by Juncos, Fox Sparrows and Tree Sparrows, Horned Larks, and Snow Buntings. Pine Siskins and Pine Grosbeaks were heard from in numbers in some parts of the Provinces and in northern New England, and they had begun to come into southern New England in increasing numbers.

Immense Flights of Waterfowl. — There were immense flights of cormorants and ducks, and large flocks of all three scoters, mostly on the coast. Unusual numbers of Blue-winged Teals had passed. Geese were moving all through the month, and there were reports of Brants in the interior. During the third week of October an immense number of Woodcocks appeared locally near the Maine coast. Elsewhere no large number was reported, but there was a very great flight of Wilson's Snipes. Hawks were moving all the month. The great flight began to arrive at Block Island about September 25, and continued during the first three weeks in October. The peculiarity of this migration at Block Island was that Duck Hawks were by far the most numerous species, and they were more common than usual elsewhere. Barred Owls and Horned Owls began to appear in the Provinces.

Migrating Swallows blown out to Sea. — On October 3, 4 and 5 many hundreds of Tree Swallows were seen in Plymouth County, Massachusetts. They disappeared on the 6th. On the 9th about 300 Tree Swallows were seen on Cape Cod, and another flock was noted on the 10th. For several days afterward there was a strong northwest wind, but on October 14

the wind changed to the south with rising temperature. On that morning hundreds of Bank Swallows, Tree Swallows and at least one Barn Swallow came up from the sea going north over Block Island toward the mainland. There was a great flight of Sapsuckers during the month.

November, 1921.

Weather changes were frequent during the first half of November, but in southern New England and southern New York the weather was generally mild. There were some cold nights and stormy days in northern Maine, and in parts of the Provinces cold waves and snowstorms were reported. Apparently winter began early in the North. There was a cold night on November 6, and a great southward movement of birds of the northern regions occurred that week.

Extreme Cold in the North. — The St. John River in New Brunswick was reported closed to navigation on November 15, one of the earliest dates on record. Deep snow had fallen in many regions. The latter half of the month was somewhat unsettled in southern New England, with some stormy weather during the last week. The 19th and 20th, however, were very warm Indian summer days, when buds began to develop, and a few days later some small green pears just beginning to grow were plucked from a tree in Middlesex County, Massachusetts.

A Destructive Ice Storm. — On the 24th in some places, and on the 25th in others, a storm of rain with intermittent gales began which continued until the night of the 30th. In northern New England this storm came principally in the form of hail or snow; in southern New England it was rain, snow, hail and sleet. The freezing rain coated heavily with ice the trees in a wide belt from southern and central New England to central New York. The ice storm, together with the wind, ruined a large number of trees throughout much of this region, covered everything with ice so that the birds could get no food, and drove many of them southward. This was the greatest ice storm on record in recent times. It broke down poles and wires; stopped and delayed trains; put trolley and electric light companies out of business for a time; and weighted down with ice many migrating birds.

Tremendous Flights of Wild Fowl. — Before and during the storm there were tremendous flights of ducks and geese. Canada Geese, completely exhausted came down in woods, pastures, fields and small ponds. In some cases they were ice-covered. A large number of sea birds were driven in on Cape Cod. Many small birds were covered with ice and succumbed to cold and starvation. There was a very considerable flight of Horned Owls in parts of the Canadian Provinces and a flight of Barred Owls in northern New England. These migrations were not noted in southern New England. On November 21 Goshawks were reported in northern Ontario. During the latter part of the month Evening Grosbeaks and Pine Grosbeaks came into southern New England in increasing numbers, and there were some reports of Redpolls and Pine Siskins. From September onward until November there were many reports of Mockingbirds, principally along the coast of southern New England.

Notable Events of the Year.

Among the outstanding events of the year were the spring flight of Gnatcatchers, the flight of white herons, an unusual flight of Great Northern Shrikes in October and November, an immense autumnal migration of ducks, Canada Geese, brants and Double-crested Cormorants, a southward autumnal movement of boreal forest birds, and a remarkable number of cases of partial albinism which have been reported from many parts of New England among birds of many species from the size of a sparrow to that of a crow or a duck. There seem to have been few cases of complete albinism.

AN INQUIRY REGARDING THE OPEN SEASONS ON CERTAIN GAME BIRDS.

At the opening of the year the result of the closed season on Ruffed Grouse in 1919 seemed rather disappointing. The birds had increased rapidly under protection in some sections, but not in others. Many people had expressed the belief that the birds should be protected at all times for one, two, three or five years more.

An insistent demand was made by gunners in southeastern

Massachusetts for a change in the open season on wild fowl. The present Federal season is September 15 to January 1, and the demand was for an open season from October 15 to February 1.

A questionnaire asking whether the recipient favored extending the closed season on Ruffed Grouse, and also whether he favored a change in the wild-fowl season, was distributed very widely from this office. The first question was answered in the affirmative by a tremendous majority, but opposition to legislation for this purpose was strong among the gunning fraternity, and a bill framed to give the Conservation Commission the right to establish a close season on Grouse whenever in their judgment such action should become necessary was killed in committee. On the question of extending the wild-fowl season through January, opinion was about evenly divided. The majority of gunners in southeastern Massachusetts was in favor of this, but in the rest of the State the majority was strongly against it. No action was taken.

METHODS OF PROTECTING SPROUTING CORN FROM CROWS AND OTHER BIRDS.

During the spring there was considerable complaint regarding the destruction of sprouting corn by birds, particularly Crows. If corn is properly treated Crows will not pull it; while in clay soil, if it is planted 4 inches deep, they cannot pull it. But deep planting will delay germination somewhat. Corn treated with tar is distasteful to all birds, and it can be so prepared that it can be put in with a corn planter. The following receipts for tarring corn are credited to those who sent them to the Board of Agriculture in former years:—

Put one-fourth to one-half bushel of corn in a half-barrel tub; pour on a pail full of hot water, or as much as is necessary to well cover the corn; dip a stick in gas tar and stir this briskly in the corn; repeat until the corn is entirely black; pour off on to burlap (bran sacks are excellent); spread in the sun and stir two or three times during the day. If this work is done in the morning, and the day is sunny, the corn will be ready for the planter the next day without any other care. The hot water softens the tar so that only just enough will adhere to the corn, and the corn is completely glazed by the sun. This is by far the quicker way of tarring corn, is harm-

less and effectual, and I have for years planted corn treated in this way with a machine. — ETHAN BROOKS, West Springfield, Massachusetts.

I have never had any trouble in using the planter. I usually, however, tar the corn a day or two before planting, and spread it out to dry. My method is to put a bushel of corn in a barrel; pour hot water into it to warm it; drain off the water; take a stout stick, dip it into coal tar; stir up the corn and then roll the barrel until the corn is all coated. In this way very little tar is used. Then I throw in a few handfuls of land plaster, roll it around and spread the corn out to dry. It does not interfere in the least with the working of the planter. — J. N. PARDEE, South Billerica, Massachusetts.¹

Others have used creolin with good effect. It is hoped that others still will try it and report the results. Some farmers who do not care to take the trouble to tar their corn, sprinkle soaked corn around the edges of the cornfield when the corn is sprouting, and thus feed the Crows until the corn gets too large for them to pull.

¹ Care must be taken not to use too much tar or too hot water as either might interfere with germination.

ANNUAL REPORT

OF THE

DIVISION OF PLANT PEST CONTROL

FOR THE YEAR ENDING NOVEMBER 30, 1921

REPORT OF THE DIVISION OF PLANT PEST CONTROL.

INSPECTION WORK.

The inspection of the nurseries, and the white pine blister rust and European corn borer work have been conducted along the lines pursued last year.

The interstate shipments of nursery stock began about the middle of March, and an unusually large number of these were inspected at their destination. Most of them were in good condition, free from infestation, and of good quality stock, but a few were rather badly infested with oyster-shell scale. These infested shipments were destroyed with one exception, in which case the stock was returned to the consignor.

The Federal Horticultural Board restricts the importation of nursery stock from foreign countries except under special permit. For this reason very few shipments are brought in. However, last spring a brown-tail nest was found on a shipment of fruit-stock from France and a saw-fly larva in the tip of rose stock imported from England.

The inspection of growing stock in the nurseries commenced the last of April. All of the pines were inspected for the European pine shoot moth, and the five-leaved pines for white pine blister rust. A few white pine were found infected with blister rust in one nursery, but as infected pine had been found in the same nursery a few years previous, it was not surprising that new infections appeared. As the blister rust is known to remain dormant for several years, it is possible that outbreaks will appear even later. All *Ribes*, both wild and cultivated, have been removed from around the nurseries that grow any large number of five-leaved pines. This should stop the spread and protect the pines from further infection.

The summer or general inspection consumed practically all of July, August and September. As a whole, the nurseries were in excellent condition, and especially free from San José

scale. In most cases where this scale was found, the infested plants were so few that they were destroyed. The practice of destroying infested plants, together with the spraying and parasites of this scale, have greatly reduced the annual infestations in the nurseries, and each year finds conditions improved. A small amount of oyster-shell scale was found, principally on lilacs, willows and poplars. This scale is very common and widespread, and at the same time difficult to combat. It differs from the San José scale in that it passes the winter as eggs under the scale. These eggs hatch about the middle of June, and spraying at this time with a contact poison of summer strength is the most effective remedy. These insects must be hit with the spray if they are to be killed, and because of the dense foliage in June it is a very difficult job to do thoroughly. Several authorities claim that spraying with lime-sulphur in the winter, or preferably in the early spring just before the buds open, is very effective. The lime-sulphur seems to loosen the scales from the bark so that they are more exposed to their enemies or are even sometimes blown away.

Satin Moth.

A new insect in this country, the satin moth, was discovered in Medford in 1920. The moth is closely related to the gypsy moth, and, probably on account of some of its similar habits, was able to become firmly established before being discovered. So far this insect has been found only on willows and poplars, and European writers record it as feeding chiefly on these trees. In Massachusetts the satin moth is known to be in 63 towns, and probably a careful survey would show it to be in many more. The moth appears in July and lays its eggs in clusters on the bark and leaves of trees, although sometimes they are found on stones or even on the ground. The eggs hatch in a few days, but the young feed very little in the late summer and fall. With the approach of cold weather they spin a web in a crevice of the bark, where they pass the winter. It is very difficult to observe them in this stage, as the web is very small and the color closely resembles that of the bark. The insect is in this stage during the period when the fall and spring shipments of nursery stock are made, and a very careful in-

spection is necessary to locate them even on badly infested trees. In the late spring the caterpillar leaves the web and feeds on the young tender leaves, and often completely defoliates poplar trees. Spraying the trees thoroughly with arsenate of lead at the time the caterpillars are feeding will keep the insect in check. The Federal government has already held a hearing relative to a quarantine against this pest, and in all probability will prohibit the shipment of willows and poplars from within the infested area.

Juniper Webworm.

The juniper webworm was found in a few nurseries on Swedish and Irish junipers. When abundant this insect does considerable damage and causes the tree to become unsightly. It can be controlled by spraying thoroughly with arsenate of lead. This application should be made preferably when the larvæ are small.

Brown-tail and Gypsy Moths.

A very few brown-tail moths' nests were found in some of the nurseries in the northern part of the State, but these were readily taken care of. The gypsy-moth inspection, which was started early in September, showed clearly the results of careful management and thorough spraying. The nurseries were found to be freer from this pest than they have been for several years. This condition was of great assistance to us in our inspection, and allowed us to issue certificates to the larger nurseries in several cases before their shipping season was well under way, thus relieving us of the necessity of having a man stationed at the nursery.

A total of 164 nurseries were inspected and 153 certificates issued. In addition, 126 licenses were issued. These licenses cover the sales of nursery stock made by agents as distinguished from the actual growers.

European Corn Borer.

The European corn borer work has been carried on in co-operation with the United States government as heretofore. The same methods of field and market inspection continue to

operate very satisfactorily. The field inspection requires a large force of men, and if the crop inspected is found free from the corn borer and the surroundings the same, a certificate is granted and tags issued allowing the gardener to dispose of the crop as he sees fit. In case the crop does not come up to the inspection standard, it cannot leave the infested area. This inspection applies to celery, green beans in the pod, beets with tops, spinach, rhubarb, oat and rye straw as such or when used for packing, cut flowers or entire plants of chrysanthemum, aster, cosmos, zinnia, hollyhock, and cut flowers or entire plants of gladiolus and dahlia, which are all the quarantined plants except corn. Corn on the cob is quarantined absolutely, and cannot leave the infested area even after inspection. Seed corn may be shipped, however, if shelled, but not on the cob. The scouting for the corn borer has been continued, and in Massachusetts a few more towns were found infested this past year, so that to date 147 towns are in the quarantined area. A small increase in area will probably be evident each year through natural spread, but the quarantine is proving very effective here in checking any new outbreaks. The infested areas in New York and Canada are not from the Massachusetts infestation, but are separate or individual infestations, resulting from shipments of European broom corn to those localities, while the outbreaks in Ohio and Michigan are a result of spread from the Canadian infestation. An interesting point in the life history of the corn borer has been brought out, namely, that in Massachusetts the borer has two broods and infests an unlimited number of food plants, while in New York, Canada, Michigan and Ohio the insect is single-brooded and confines its attack to corn and one or two weeds. This shows that the insect we have in Massachusetts is more injurious than the single-brooded insect, and should be controlled as far as possible. It is recorded by European writers that in Austria the corn borer is single-brooded, while in Italy it is two-brooded, so it may be that Massachusetts was indebted to Italy for her infestation, while the other American infestations originated from shipments of corn from Austria.

Corn Ear Worm.

During the early fall numerous specimens of what persons supposed were European corn borers were sent in from all over the State, but in the majority of cases they proved to be the corn ear worm. This insect was very prevalent this year, especially in late sweet corn, in a large measure owing to the long season. The corn ear worm is found throughout the United States, and in certain localities is a very serious pest to sugar corn.

WHITE PINE BLISTER RUST.

The white pine blister rust work was carried on under the management of Mr. C. C. Perry, and the excellent results obtained were due largely to his efficiency and attention.

The present knowledge of the status or distribution of the white pine blister rust in Massachusetts is not as complete as might be desired, because no organized scouting has been conducted since 1917, all available funds having been needed to carry out the program of local co-operative control work. The records indicate, however, that to date (1921) the disease has been found on *Ribes* (currants and gooseberries) in 269 towns, and on pine in 81 towns out of a total of 354 cities and towns within the State.

As in previous years, control work — namely, the removal of currants and gooseberries — has been conducted by the Division of Plant Pest Control in co-operation with the Bureau of Plant Industry, United States Department of Agriculture. Beginning July 1, however, Federal dollar-for-dollar co-operation was withdrawn, and the work conducted with State and local funds, the Federal Department continuing its interest in the work by paying the salary of the agent in charge of the field work.

The policy adopted for the season was merely a continuation of that of last year, providing for the conduct of control work on the local co-operative basis. The ratio of co-operation was changed somewhat, however, in that town appropriations were met at the one-third rate, and private subscriptions on the dollar-for-dollar plan. Under this arrangement three towns (Athol, Hubbardston and Stockbridge) appropriated a total of

\$1,200, and 35 property owners in Lenox, Lee and Stockbridge subscribed \$2,434. The State Department of Conservation also expended \$500 to complete the removal of *Ribes* from the lands comprising the Otter River State Forest in Winchendon. In all, a total of \$10,750.78 was expended by the State and its co-operators and the Federal Department. Examinations were made on 32,933 acres of land, upon which 631,516 *Ribes* (626,885 wild and 4,631 cultivated) were found and destroyed at a per acre cost of 33 cents. This cost represents a marked reduction over the cost of the work in any previous season.

The usual practice employed in the removal of *Ribes* is to gridiron the area to be examined, as follows:—

A crew of from three to seven men line up side by side, from 6 to 12 feet apart, and starting on a road advance into a wooded area in line formation, an additional man, acting in the capacity of a foreman, following behind the crew to direct and check up the work. In this manner the ground is very thoroughly examined for possible *Ribes* plants, and when any are found they are pulled up, using care to get the entire root system, and then the bushes are hung up in the crotch of a small tree or in the crevice of a stone wall, the air soon drying out the roots, and thus killing the plant. This method is known as the strip-formation method.

In open areas, such as fields, pastures, etc., the crew is usually divided into smaller units, two men pairing in the examination of stone walls, rock piles, gardens and other favorable habitats. Such a crew unit has been termed a stone-wall crew.

In addition to these intensive methods of examination, there is still another method which is known as preliminary or advance scouting. In the case of this system, one or two men, preferably two, enter the area from which it is desired to eliminate *Ribes*, and by a process of scouting determine the location of the *Ribes* within the area. If only a few scattered bushes are found, the scouts pull these, but when larger patches are found, the location of such a plot is marked and the regular crew directed to eradicate the bushes. In this way the work of the crew is localized, and the intervening areas are scouted out by the two men, thus greatly reducing the total cost of the work.

This method can be used only where wild *Ribes* are relatively scarce, or in sections where the pine area is so small that it hardly pays to work the other forest types intensively.

The field work in Massachusetts this season has been conducted on practically the same basis as last year, the tendency being to employ the smaller crew units of four or five linemen and a foreman, and the two-man stone-wall crew. Preliminary scouting has been practiced on a much larger scale than in former years, and has proved a most important factor in reducing the per acre cost of the work. The field force employed has consisted of one supervisor, six scouts, eight foremen and thirty crew laborers.

Infection on *Ribes* this year has not been abundant, due, no doubt, to the fact that very dry weather prevailed just at the time the spores were being liberated from the cankers on diseased pines. Infection on pine was found in two towns (Athol and Winchendon) in which it had not been previously reported.

This fall exhibits were prepared for display at the larger agricultural fairs, and at a majority of these a live interest was shown in the material on exhibition, demonstrating quite clearly the need of educational work of this character on a more intensive basis.

The printed report summarizing the status of the blister rust in the United States in 1920 (Bulletin No. 6, American Plant Pest Committee) was sent to tree wardens, pine owners and nurserymen, accompanied by letters calling particular attention to the seriousness of the disease and to the feasibility of control work. Warning cards were distributed to Massachusetts nurserymen for insertion in shipments of pines and *Ribes*, urging planters to refrain from the cultivation of *Ribes* in localities in proximity to white pine.

Three hundred and seventy-five permits were issued during the year to nurseries outside the State for the shipment of *Ribes* into Massachusetts. These permits allow the shipment of *Ribes* (except black currants) to any place in the State except the twenty towns listed below. These towns are those in which control work has been in progress and in which further planting is prohibited.

Athol.	Ipswich.	Pembroke.
Barre.	Lee.	Petersham.
Dana.	Lenox.	Phillipston.
Duxbury.	Marshfield.	Stockbridge.
Halifax.	Newburyport.	Topsfield.
Hanover.	North Andover.	Warwick.
Hanson.	Orange.	

A detailed summary of the control work of the season is presented in the following table:—

Summary of Co-operative White Pine Blister Rust Control Work, 1921.

PROJECT OR TOWN.	Average ex- amined.	NUMBER OF RIBES DESTROYED.					COST DETAIL.				
		Wild Goose- berry.	Skunk Currants.	Wild Red and Black Currants.	Culti- vated Ribes.	Total Ribes.	Supervi- sion.	Labor (Wages).	Expenses.	Total Cost.	Per Acre.
Athol	13,155	15,656	17,425	5,284	184	38,549	-	\$1,730 44	\$124 00	\$1,854 44	\$0 14
Hubbardston	6,430	22,851	59,894	3,787	145	86,677	-	625 20	67 50	692 70	11
Lee	350	5,142	-	3,037	7	8,186	\$8 63	108 16	16 00	132 79	38
Lenox	5,560	53,694	120	34,373	1,432	89,619	362 62	2,557 36	142 49	3,062 47	53
Stockbridge	6,880	66,618	-	121,234	2,844	190,696	180 87	3,280 16	164 26	3,625 29	48
Otter River	558	52,653	165,117	-	19	217,789	-	1,314 48	68 61	1,383 09	2 47
Totals	32,433	216,614	242,556	167,715	4,631	631,516	\$552 12	\$9,615 80	\$582 86	\$10,750 78	\$0 33

REPORT OF THE STATE INSPECTOR OF APIARIES FOR THE YEAR
ENDING NOVEMBER 30, 1921.

The appointment of the Inspector of Apiaries in 1921, after several years absence, was for part-time service, and the work was largely administrative. The following were appointed deputy inspectors: Mr. Edwards Thorne, Worcester, and Mr. Ivan Rawson, Pittsfield. Mr. O. F. Fuller, Blackstone, served temporarily. The reduced appropriation, accompanied by advanced costs of transportation and minor expenses, although the fee for service was not increased, has restricted in proportion the total possible inspection as compared with former years. Notwithstanding this handicap, quite satisfactory results were obtained. The fact that the beekeepers as a whole are increasingly able to detect and to treat bee diseases enables the inspectors to proceed faster and devote more time to cases particularly needy.

In Berkshire County the work centered from Pittsfield. Most of the towns in the county were visited, some more extensively than others. In only a few instances were conditions found to be other than encouraging.

From Springfield, Hampshire and Hampden counties were covered. Some work was also necessary in Franklin County, although strikingly less than in portions of Hampden County. In several of the towns here repeated inspection was necessary in order to bring under control certain apiaries. This district will be thoroughly covered in 1922 to check up the work already done.

Worcester was the center from which Worcester County and east into Middlesex and Essex counties and southeast to some extent were covered. No serious disease nests^b were found in Worcester County, possibly excepting a local infection in the northern part. This was apparently suppressed, but needs checking over in 1922. Framingham and vicinity gave considerable concern, requiring repeated calls throughout the season because of a local outbreak of American foulbrood. This is considered entirely controlled.

In the southeastern part of the State it was possible to visit areas needing inspection. In 1922 it would be desirable to

extend this territory further, although in general, conditions are improved over those formerly obtaining. As a whole, disease conditions in Massachusetts are not serious, but are improved. However, it is necessary to do about as much traveling as formerly in order to detect the isolated or unexpected cases. With a few exceptions no great amount of disease is found in any one apiary, as it might have been some years ago. The cases found to-day usually are less well-developed or of less protracted duration, which suggests that the beekeepers are more conversant and do not allow diseases to get headway as formerly. Beekeeping is otherwise improved also.

There is a desire among some of the beekeepers who keep up in their reading to try the newly advocated treatments for European foulbrood. The writer's experience is that germicidal or medicinal treatments, on the whole, are not safe, advisable or efficient. Hence, these so-called "remedies" have not been encouraged.

The season for beekeepers has not been marked either by a successful crop or a failure, excepting in a few localities where perhaps the crop was above average. Bees wintered well in 1920-21, and were ready for the harvest early. However, climatic conditions did not favor nectar secretion in late June and July in most parts of the State. Bees have gone into winter quarters late in the fall with relatively good stores. The winter thus far does not promise to be disastrous. The ground is well covered with snow, which should favor an excellent crop of clover in 1922 if it holds throughout the winter, perhaps affording another heavy clover yield such as occurred some six years ago.

ANNUAL REPORT

OF THE

DIVISION OF RECLAMATION, SOIL SURVEY
AND FAIRS

FOR THE YEAR ENDING NOVEMBER 30, 1921

REPORT OF THE DIVISION OF RECLAMATION, SOIL SURVEY AND FAIRS.

RECLAMATION.

Inasmuch as the activities of this Division in reclamation work have been carried out in connection with the State Drainage Board, of which the Director is the secretary, the report of the State Drainage Board follows:—

REPORT OF THE DRAINAGE BOARD.

The Drainage Board, as authorized under chapter 252 of the General Laws, is composed “of one member designated by the department of public health and one member designated by the department of agriculture.”

The Drainage Board of 1921 comprises Mr. Warren C. Jewett, chairman, of Worcester, who represents the Department of Public Health, and Leslie R. Smith, secretary, of Hadley, representing the Department of Agriculture. During the year 1921 the Board has received and acted upon three petitions from landowners in as many different areas, who have asked help of the Board in organizing a drainage district as authorized under chapter 252 of the General Laws.

Green Harbor Drainage District.

The first petition was from certain landowners residing in the town of Marshfield, who asked for aid in organizing a drainage district to be known as the Green Harbor Drainage District. After viewing the area personally, the Board proceeded to appoint a local drainage commission, as provided in chapter 252. Further action was delayed because of the fact that the local landowners have not decided what course to pursue in order adequately to drain the area, which contains approximately 1,300 acres.

Salisbury Drainage District.

A petition was received from certain landowners in the town of Salisbury for the aid of the Board in forming the Salisbury Drainage District. The Board was favorably impressed with

the project, which would improve approximately 1,100 acres of land situated directly back of Salisbury Beach. The Board has appointed a local drainage commission, and the project is held up awaiting an amendment to chapter 252 of the General Laws. It developed that the logical place for dikes and tidewater gates necessary to carry out the project is situated over the line in the State of New Hampshire.

Weweantic River Drainage District.

A petition was received from certain landowners in the town of Carver asking aid in forming the Weweantic River Drainage District. The Board viewed the area and found that this area contained nearly 3,000 acres of cranberry bog dependent on the Weweantic River for drainage. The local drainage commission was appointed, the county commissioners of Plymouth County have voted to finance the district to the extent of \$10,000, and the work of clearing out the Weweantic River is about to begin.

Herring River Project.

Upon request of certain landowners in the town of Wellfleet, the Drainage Board visited the area in that town, drained by the Herring River. This is a case where considerable State money has been expended in building a good dike with the necessary tide-gates, and where the main river above the dike has grown full of wild rice, grass and flag in such a way as to clog the stream almost completely. The Board has not as yet received a petition from the owners of land in this district.

Nova Scotia Trip.

On June 23, 1921, Commissioner of Agriculture Dr. Arthur W. Gilbert, Professor Sidney B. Haskell, Director of the Experiment Station at the Massachusetts Agricultural College, together with Messrs. Jewett and Smith of the Drainage Board, went to Nova Scotia to study the great salt marsh areas which have been drained, some of them, for more than one hundred years. The party was shown the Great Canard Marsh and the Wellington Dike, the Wickwire Marsh, the extensive marsh areas around Grand Pré, also the various marshes around Nappan. The party was able to learn of the successes and failures of these extensive drainage projects. One important feature impressed itself upon all members of the party, and that was the absolute

necessity of State supervision over any drainage district. Local drains must be kept clear and the areas must be properly fed and cultivated in order to warrant the expenditure of public funds.

Summary of Expenditures for Year.

Appropriation	\$1,000 00
Cost of work of Drainage Board for year	970 20
	<hr/>
Balance unexpended	\$29 80

LESLIE R. SMITH,
Secretary, Drainage Board.

SOIL SURVEY.

During the year the Department has co-operated with the United States Department of Agriculture, Bureau of Soils, as before.

The survey has been conducted in Worcester County, and the work is three-fifths completed in that county. Cost of the work for the year, \$805.43.

FAIRS AND EXHIBITS.

The Department of Agriculture offered prizes at 76 agricultural fairs this last year. The Department also made special exhibitions at the union agricultural meeting in Boston; at the State Building at the Eastern States Exposition in Springfield; at the Hampshire, Franklin and Hampden Agricultural Fair in Northampton; at the Franklin County Agricultural Fair at Greenfield; at the Brockton Agricultural Society in Brockton, and the New England Fruit Show in Concord, New Hampshire; at two corn shows, — the Essex County Agricultural School Corn Show and the Massachusetts Corn Show. The Department awarded prizes to 15 poultry associations and two rabbit associations, and conducted a window display contest in Springfield. The Department also awarded medals at various fairs and at the Eastern States Exposition, and financed the boys' and girls' Club Camp at Massachusetts Agricultural College.

Of the 76 fairs mentioned, 28 may be classed as major fairs, and these are managed by the old, incorporated agricultural societies of

long standing. Most of these societies own their exhibition grounds with the buildings and equipment. There are 48 of the fairs which may be called minor or community fairs; a few of these have grounds, but most of them show in tents or halls.

For two years the larger fairs have been inspected by representatives of the Department. This last year, all of them, county and community, have been inspected and scored. This score, together with such other general information as is available, will be the basis for the prize money allotment of this next year. In addition to the State prizes, medals have been offered for certain exhibits and for special individual accomplishments, while in many cases help has been given in rearranging premium lists and in other ways. From the reports of the inspectors we learn that with four exceptions the fairs were more successful than in 1920.

Allotment of Prize Money.

Agricultural Prize Money allotted to Societies and Fairs.

NAME.	Allotment.	Award.
Acton Agricultural Association	\$250 00	\$250 00 ¹
Amesbury and Salisbury Agricultural and Horticultural Society	200 00	62 00 ¹
Anawan Grange (Rehoboth) ²	50 00	43 00
Andover Grange	50 00	— ³
Barnstable County Agricultural Society	600 00	600 00 ¹
Becket Grange Community Fair	50 00	31 00
Bedford Grange	50 00	52 00
Blackstone Valley Agricultural Society	600 00	503 50
Bournedale Agricultural Society	50 00	50 00
Braintree Grange	50 00	50 00
Brimfield Grange	50 00	33 00
Bristol County Farmers Society (Segreganset)	100 00	98 00
Concord Grange	50 00	30 50
Dedham Grange	50 00	50 00
Deerfield Valley Agricultural Society	700 00	700 00 ¹
Essex Agricultural Society (Topsfield)	400 00	399 50 ¹
Framingham Agricultural Exhibition	50 00	43 50
Franklin County Agricultural Society	1,000 00	1,000 00 ¹

¹ Prize medals.

² An agricultural fair held under the auspices of the Grange; competition open to all.

³ No fair held.

Agricultural Prize Money allotted to Societies and Fairs — Continued.

NAME.	Allotment.	Award.
Falmouth Agricultural and Horticultural Society . . .	\$50 00	\$50 00
Garfield Grange of North Dana	50 00	44 00
Gill Grange	50 00	40 00
Greater Lynn Fair	350 00	353 00 ¹
Great Barrington Grange	50 00	— ²
Groton Farmers and Mechanics Association	450 00	450 00 ¹
Hampshire, Franklin and Hampden Agricultural Society	1,000 00	1,000 00 ¹
Harwich Agricultural Society	50 00	50 00
Heath Agricultural Society	100 00	90 00
Highland Agricultural Society	700 00	696 75 ¹
Hillside Agricultural Society	700 00	700 00 ¹
Hingham Agricultural and Horticultural Society	100 00	97 75
Hinsdale Grange	50 00	46 00
Holliston Grange	50 00	40 00
Hoosac Valley Agricultural Society	350 00	350 00 ¹
Housatonic Agricultural Society	1,000 00	999 50 ¹
Lawrence Horticultural Society	50 00	47 00
Lee Grange	50 00	43 00
Lunenburg Grange	50 00	43 00
Marshfield Agricultural and Horticultural Society . . .	450 00	450 00 ¹
Marthas Vineyard Agricultural Society	500 00	456 50
Massachusetts Agricultural College	100 00	100 00
Massachusetts Horticultural Society at Boston	200 00	— ²
Megansett Grange of North Falmouth	50 00	— ²
Middlesex North Agricultural Society of Lowell	200 00	— ²
Monomoy of Chatham	50 00	25 50
Nantucket Agricultural Society	450 00	434 75
Needham Fair	50 00	50 00
New Salem Grange	50 00	— ²
Norfolk County Agricultural Society at Walpole	150 00	150 00 ¹
Northfield Grange	50 00	44 75
Norton Grange	50 00	17 50
Otis Grange	50 00	49 50
Oxford Agricultural Society	400 00	400 00
Pembroke Grange	50 00	39 00
Plymouth County Agricultural Society	400 00	397 00
Ponkapoag Grange	50 00	40 00

¹ Prize medals.² No fair held.

Agricultural Prize Money allotted to Societies and Fairs — Concluded.

NAME.	Allotment.	Award.
Randolph Grange	\$50 00	\$33 00
Sandwich Agricultural Society	50 00	49 00
Stockbridge Grange	50 00	28 00
Southbridge Grange	50 00	-1
Templeton Grange	50 00	46 50
Union Agricultural Society	700 00	792 25 ^{2,3}
Waltham Agricultural Society	250 00	-1
Ware Agricultural and Driving Society	150 00	150 00
Warren Grange	50 00	49 50
Wendell Grange	50 00	42 00
West Brookfield Grange	50 00	-1
Westminster Farmers and Mechanics Association	50 00	50 00
West Newbury Grange — "Laurel"	50 00	41 00
Westport Agricultural Society	500 00	498 75 ²
Weymouth Agricultural and Industrial Society	75 00	75 00
Williamsburg Grange	50 00	38 00
Worcester Agricultural Society	1,000 00	995 50 ²
Worcester County West Agricultural Society	650 00	600 00 ²
Worcester North Agricultural and Driving Association	650 00	650 25 ²
Worcester Northwest Agricultural and Mechanical Association	650 00	645 50
Worcester South Agricultural Society	650 00	648 00
Totals	\$19,375 00	\$17,222 75

¹ No fair held.² Prize medals.³ \$99.25 of this amount awarded in 1920 show.*Boys' and Girls' Club Work.*

As a reward for completing various club projects in the several counties of the Commonwealth, the county winners or leaders were invited to spend ten days at Camp Gilbert, at the Massachusetts Agricultural College at Amherst.

This camp is conducted by the college for such county leaders, and it is financed by the Department of Agriculture.

Camp expenses	\$1,285 93
Ribbons, pins, books (prizes)	579 28
	<hr/>
	\$1,865 21

Medals.

At various fairs medals were offered for special or meritorious exhibits. The inspectors were also allowed in certain cases to award special medals for individual accomplishments.

At the Eastern States Exposition gold medals were offered for the champion dairy cow, one each of five named breeds, bred and owned in Massachusetts. Medals were awarded as follows: —

Eastern States Exposition	5 gold medals
Worcester Agricultural Society	{ 1 gold medal 6 silver medals 1 bronze medal
Franklin County Agricultural Society	5 silver medals
Hampshire, Franklin and Hampden Agricultural Society	{ 2 gold medals 6 silver medals
Housatonic Agricultural Society	4 silver medals
Essex Agricultural Society	1 bronze medal
Greater Lynn Agricultural Fair	{ 1 silver medal 1 bronze medal
Westport Agricultural Society	1 silver medal
Hoosac Valley Agricultural Society	2 silver medals
Acton Agricultural Society	{ 1 silver medal 1 bronze medal
Waltham Agricultural Fair	{ 1 silver medal 1 bronze medal
Norfolk County Agricultural Society	{ 1 silver medal 1 bronze medal
Amherst Poultry Association, Inc.:	
Best hen	1 bronze medal
Eastern Massachusetts Poultry and Pigeon Association, Inc.:	
Best cock	1 bronze medal
Best hen	1 bronze medal
Stoughton Poultry Association, Inc.:	
Best cock	1 bronze medal
Best hen	1 bronze medal
Boston Poultry Association:	
Best pullet	1 silver medal
Best cockerel	1 silver medal
Marthas Vineyard Agricultural Society	1 silver medal
Groton Farmers and Mechanics Club	{ 1 silver medal 1 bronze medal
Marshfield Agricultural Society	3 silver medals

Worcester North Agricultural Society	1 bronze medal
Worcester Northwest Agricultural Society	1 silver medal
	1 bronze medal
Worcester South Agricultural Society	1 silver medal
	1 bronze medal
Barnstable County Agricultural Society	1 silver medal
	1 bronze medal
Deerfield Valley Agricultural Society	1 bronze medal
Highland Agricultural Society	2 bronze medals
Hillside Agricultural Society	1 silver medal
	2 bronze medals
Union Agricultural Society	1 bronze medal
Worcester County West Agricultural Society	1 silver medal
	1 bronze medal
Middlesex North Agricultural Society	1 silver medal
	1 bronze medal
Amesbury and Salisbury Agricultural Society	1 silver medal
	1 bronze medal

Rabbit Exhibits.

The Department offered prizes at two exhibits of rabbits in accordance with the amendment to the general law governing the allotment of State prize money, as follows:—

NAME.	Allotment.	Award.
Southeastern Massachusetts Rabbit Breeders and Fanciers Association.	\$45 00	—
United Rabbit and Cavie Club of Massachusetts	45 00	\$45 00
	\$90 00	\$45 00

Window Display Exhibit at Springfield.

Six State prizes to the amount of \$100 were offered, three for fruit and three for vegetables, for the best window displays in the city of Springfield during the dates of the Eastern States Exposition. There were 41 windows entered.

The windows were required to be on the main streets and all the fruit and vegetables grown in Massachusetts.

Prizes	\$100 00
Judging	52 60
	<hr/>
	\$152 60

Special Exhibitions.

At the union agricultural meeting held in Horticultural Hall, Boston, February 8, 9, 10 and 11, 1921, the Department offered prizes for corn exhibits; also at an exhibit at the Essex County Agricultural School prizes were offered for corn.

At the Franklin County Agricultural Fair the Department made a special exhibit showing stereomotorgraph, plant pest control work, and the latest literature from the Division of Information.

The largest special exhibit was in the Massachusetts Building at the Eastern States Exposition at Springfield. Here the entire building was given over to an educational, agricultural exhibit, with the exception of space allotted to the Department of Conservation for Fish and Game, Animal Industry and Forestry exhibits.

A special exhibit was made at the Three Counties Fair at Northampton, consisting of Soil Survey exhibits and literature from the Division of Information.

The Department also offered prizes for Massachusetts grown fruit at the eighth annual New England Fruit Show held at Concord, New Hampshire.

Expenses of Special Exhibits.

Corn show prizes at Essex County Agricultural School	\$65 50
Corn show prizes at Massachusetts Corn Show	310 00
Special exhibit at Union Agricultural Meeting	652 88
Special exhibit at Eastern States Exposition	3,294 03
Special exhibit at New England Fruit Show	465 23
	<hr/>
	\$4,787 64

POULTRY SHOWS.

This Department offered prizes at fifteen poultry shows during 1921. Each of these shows is inspected by a representative of the Department, and the report is on file. The prize money was allotted as follows: —

NAME.	Allotment.	Award.
Amherst Poultry Association	\$135 00	\$135 00
Athol Poultry Association	50 00	- ¹
Boston Poultry Association	50 00	- ¹
Eastern Massachusetts Poultry and Pigeon Association . .	225 00	150 00
Gardner Poultry Association	85 00	50 00
Gloucester Poultry Association	100 00	- ¹
Great Barrington Poultry Association	150 00	75 00
Holyoke Poultry Association	175 00	150 00
Hub Poultry Association	125 00	56 00
Lenox Poultry Association	150 00	99 00
New England Poultry Association	175 00	150 00
Northampton Poultry Association	150 00	138 00
Needham Poultry Association	50 00	- ¹
Springfield Poultry Association	175 00	- ¹
Stoughton Poultry and Pigeon Association	150 00	222 00 ²
	\$1,945 00	\$1,225 00

¹ No show.² \$100 of this awarded for 1920 show.*Summary of Expenditures.*

Appropriation \$28,043 00

Paid:

Prizes at fairs	\$17,222 75	
Special exhibits	4,787 64	
Poultry and rabbit shows	1,270 00	
Boys' and girls' clubs (camp)	1,865 21	
Medals	923 00	
Postage	125 00	
Stereomotorgraph	322 75	
Window display	152 60	
		26,668 95
Balance		\$1,374 05

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